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Interdisciplinary Pedagogy through Problem-Based Learning: A Case Study in Global Health Education

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ABSTRACT

This case study piloted an interdisciplinary Problem-Based Learning course, utilizing Hung's (2006) 3C3R model. We explain the course design, curriculum, and implementation. We collected qualitative written questionnaires from students who participated in the course to investigate their learning experiences. As a result, students shed light on lessons they learned throughout the course, which led to the creation of a lessons learned guide for future instructors. This guide encompasses 8 lessons that were gleaned by both qualitative student feedback and instructor reflections from the course. These lessons include allocating in-class time to work on projects, using a modular approach in the course design, presenting students with real-life problems related to the topic of the course, providing in-class case studies for students to get acquainted with examples of previous work, grouping students from diverse academic backgrounds together when possible, utilizing online and librarian resources, surveying the classroom on their comfort with self-directed learning beforehand, and including a self-reflection piece at the end of the course.

Keywords: Problem-based learning, PBL, interdisciplinary, 3C3R model

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INTRODUCTION

Interdisciplinary learning is characterized by integrating knowledge from more than one discipline to address a central theme, problem, or scenario (AI-Saleem, 2018; Boon & Van Baalen, 2018; Ivanitskaya et al., 2002). During this process, students may bridge disciplines together to construct new perspectives and insights (Ivanitskaya et al., 2002; Stentoft, 2017). One common approach to exercise interdisciplinary learning is through Problem-Based Learning (PBL) (Braßler, 2016; Garrett, 2019; Imafuku et al., 2014; Kaplan et al., 2016). PBL is described as a didactic approach that allows students to engage with interdisciplinary learning, as it requires students to work in collaborative groups to identify a problem, learn and apply their knowledge to the problem, and reflect on what they have learned throughout the process (Hmelo & Ferrari, 1997; Hmelo-Silver, 2004; Stentoft, 2017).

Initially, PBL was created as an instructional method at McMaster University in Canada, to help medical school students integrate knowledge into clinical practice and navigate an abundant amount of information (Kim et al., 1999.; Maudsley, 1999; Savin-Baden & Major, 2004). Similarly, sufficient evidence has demonstrated that interdisciplinary PBL approaches offered at the post-secondary level have benefited student learning outcomes, leading to an enhanced understanding and competency across subject matters, in addition to students reporting that bridging disciplines was entertaining (Braßler, 2016; Garrett, 2019).

Given the benefits of PBL from previous literature, we created a Global Health and Human Biology course. The purpose of this course was to allow students to bridge human biology and global health concepts, in order to address a global health threat and generate creative solutions. Ultimately, the relevance of this course was to expose students to the reality of working with a limited financial budget in order to address a health issue in a particular geographical area, similar to what many private and public sector organizations seek to achieve. In doing so, students were exposed to the reality of the vast effort it takes to address these real-life health problems, and had the opportunity to become global citizens as they faced these challenges.

Theoretical Framework

As educators around the globe aim to create effective PBL courses, Hung (2006) developed a conceptual framework to systematically optimize the creation and exercise of PBL within a classroom setting. *The 3C3R model: A Conceptual Framework for Designing Problems in PBL* (Hung, 2006) includes the combination of two parts - core and processing components (Figure 1).

Core components

The core components are comprised of *content*, *context*, and *connection* (the 3 C's). These core components are intended to provide learners with the fundamental concepts to help develop a greater understanding of the real-life problem's topic. The content section involves the sufficiency of knowledge obtained regarding the topics within the course (Hung, 2006). A key element within this section is to create specific learning goals and objectives to maximize the potential for students to obtain the adequate content required for their problem-solving journey (Hung, 2006; Tawfik et al., 2013). The context section of this model explores the setting in which the course material is learned among students (Hung, 2006). It is recommended that content is learned within a similar context that it will be applied, thus allowing the knowledge to be recalled and used more easily (Godden & Baddeley, 1975; Halpern & Hakel, 2003). Lastly, the connection section serves to integrate the content and context together, with the intention of guiding learners to build unique conceptual frameworks surrounding the topic of their problem (Hung, 2006).

Processing components

The processing components are *researching*, *reasoning*, and *reflecting* (the 3 R's). Working alongside the 3 C's, the 3 R's support the engagement of the problem-solving process for the real-life problem (Hung, 2006). The researching section involves learners researching the necessary information within the domain of their problem. Simultaneously, the reasoning section promotes the application of the knowledge gained from researching, allowing students to put their knowledge into practice and develop problem-solving skills to generate new ideas, hypotheses, solutions, and engage in meaningful dialogue (Hung, 2006). During this process, Hung (2006) emphasizes the importance of calibrating the learner's comfort level of self-directed learning that is needed to adequately address and solve the given problem. In connection with establishing an appropriate level of self-directed learning, Barrows (1986) classified three levels of self-directedness within PBL into teacher-directed, student-directed, and partially student-and-teacher-directed. Additionally, within these two phases, Tawfik and others (2013) suggest incorporating a problem-solving protocol for students to identify essential characteristics of the problem and couple them into their research (Tawfik et al., 2013). Finally, the reflecting section allows students to reflect on what they have learned throughout their problem-solving process (Hung, 2006). During this section, undergoing a summary or self-evaluation of the problem-solving skills gained are key components of PBL that help achieve quintessential learning outcomes (Hung, 2006; Rinehart et al., 1986; Savery & Duffy, 1995).

The overall significance of the 3C3R model is that it provides a systematic method for instructors to design and implement effective problems within a classroom setting (Hung, 2006).

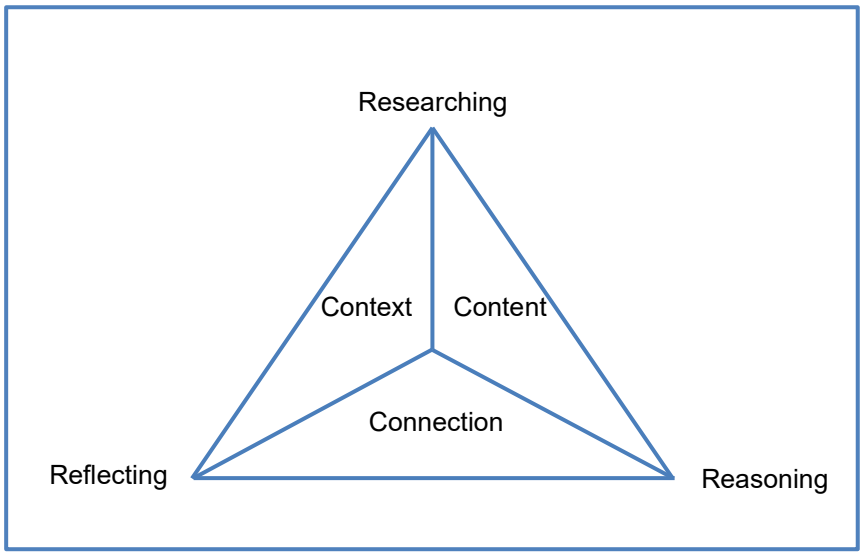

Figure 1: 3C3R PBL Problem Design Model.

With the potential impact that PBLs can have on post-secondary student learning experiences, we sought to create and pilot an interdisciplinary PBL course, which was designed utilizing the 3C3R model. The purpose of this study was to gain insight into the impact of this interdisciplinary PBL course, in order to understand how such a post-secondary pedagogical approach can contribute to higher education.

METHOD
- CONTEXT AND CONTEMPLATION

Overview of the 3C3R PBL model and designing an interdisciplinary course that is problem-based

Using the 3C3R model as a guide, we developed a third-year post-secondary PBL interdisciplinary course, entitled *Global Health and Human Biology*. This was a lecture-based course offered once a week in the Winter semester through the Department of Health & Society at the University of Toronto Scarborough Campus. Importantly, this course was designed with the following specifics to include the core and processing components within the 3C3R model:

Core components:

To incorporate the core components, we created two learning goals and utilized a three-tiered modular approach for the entire course. The learning goals for this course were twofold: to understand the dynamic connection between human biology and global health, and to address global health challenges by applying the science of human biology. The purpose of the learning goals were to establish the interdisciplinary nature of the

course and to ensure students were made aware of the learning goals. The structure of the course was in the form of the following three consecutive modules: the first two modules aimed to provide students an overview of human biology and global health as well as the context in which they connect with one another. Here, students were provided with in-class lecture-based case studies of health issues around the globe and how they are addressed by world leaders and organizations. Within the third module, the aim was to apply the connection of these two disciplines by introducing students to real-life problems, (which were different than the in-class examples in the first two modules) that involve an understanding and application of both human biology and global health knowledge. The real-life problems were selected based on being able to relate the content the students learned from the first two modules to the context of real-life global health challenges. The purpose of the three consecutive model structure was to allow students to first reach content and context acquisition, and subsequently be exposed to a real life scenario where they must connect the content and context together to solve their real world issue.

Processing components:

To incorporate the researching and reasoning sections, we created a seven-step problem-solving protocol for each group to follow in their projects (Table 1), similar to what Tawfik and others (2013) suggested. The purpose of this protocol was to provide students with a balance between freedom and structure in their researching phase. We did not want to overburden students given the vast amount of information that is available to solve their challenges, therefore, this protocol acted as guide for students to explore their creativity while having a general guide to follow. Additionally, this protocol was useful to standardize all group reports and presentations in terms of expectation and project deliverables. Students then collaborated in teams of 5-6 during the third module of the course to create a rough draft report submission. After which, each group received feedback from the course instructor. The purpose of this report was for the instructor to assess and calibrate the amount of additional support, if required by any group(s). We chose to select a partial student-and-teacher-directed learning, wherein students submitted rough drafts of their projects prior to their final presentations and reports. We did not investigate if students had been previously exposed to other PBL courses, and as such we utilized this self-directed learning approach as a buffer in order for the instructor to further support and provide feedback to learners in their problem-solving process, if needed. Lastly, each group created a final presentation and report on their respective projects (Table 2). For the reflection section of this model, after each group presented, fellow classmates had the opportunity to ask questions to the presenting group, allowing students to engage in active discussion and reflect on their problem-solving journey.

Participants

Participants represented third to fifth-year undergraduate students who were enrolled in the *Global Health and Human Biology* course in the Department of Health & Society at the University of Toronto Scarborough Campus (UTSC) in the spring semester of 2019. UTSC is known as a satellite campus of the University of Toronto, which is located in Scarborough, Toronto, Ontario, Canada. The campus provides a wide range of undergraduate studies, including Computer & Mathematical Sciences, Arts and Humanities, Social Sciences, Life Sciences, Business Management, Physical & Environmental Sciences, and Psychological & Health Sciences. The Department of Health & Society offers programs that encourage an interdisciplinary perspective to understanding health, aiming to develop well-rounded students prepared for future careers across diverse fields. Females make up the bulk of this department, and there is a diverse age range across all students. Majority of the Department of Health & Society students come from Life Sciences and Social Sciences backgrounds. This rich class makeup allowed for meaningful exchange among students in their group projects. A total of 58 students were enrolled in the course, and 43 students participated in this research study.

Data Collection

The goal of the study was to investigate the impact of this interdisciplinary PBL course, in order to understand how such a post-secondary pedagogical approach can contribute to higher education. We created a student participant questionnaire to explore reflections and lessons learned throughout this process that are theoretically grounded in the 3C3R model. As such, these reflections and lessons learned may serve as guidance for other educators who wish to utilize the 3C3R model. The interviews of participants involved the administration of a written questionnaire in class from a researcher. The questionnaire was in English and lasted for approximately the last 25 minutes of class. During this time, the researcher explained the purpose of the study and administered the consent forms. The researcher read over the consent form aloud to the class, including the two interview questions on the questionnaire. Students who did not wish to participate had the opportunity to leave the classroom. After which, the researcher collected the consent forms and administered individual paper copies of the questionnaire to the individuals who consented. The researcher remained within the class as students filled the questionnaire to answer any questions or comments they had. To maintain student anonymity, the consent form was first administered and collected from students. After which, all students who consented to participate were given the questionnaire and were instructed not to place their name, sex, year of study, or any identifying information on the questionnaire. Within the questionnaire, participants were asked what experiences and lessons they acquired from their group projects as it pertained to the course. Specifically, the questionnaire included the following two questions:

1: What has been the impact of your group projects on your learning, particularly as it pertains to bridging the disciplines of global health and human biology?

2: Enumerate any three lessons you have gleaned from undertaking your group projects as it applies to bridging the disciplines of global health and human biology. Provide examples where necessary.

Evaluation of PBL Implementation

Data Analysis

After the questionnaires were collected, participant responses were transcribed to an electronic format, which led to approximately 43 pages of text. A general inductive approach (Thomas, 2006) was used to analyse this data in relation to the 3C3R model, where relevant quotations were categorized into the various components of the model. Using this analysis method allowed the raw data to be condensed into distinct categories of the 3C3R model.

Reflections and Lessons learned:

From this process, student quotations were used as a guide to showcase the lessons learned from creating and implementing an interdisciplinary PBL course, that was grounded in the 3C3R model. Importantly, these lessons were created with the input from both the student responses, as well as instructor reflections from the course. Overall, these lessons are intended to serve as a guide for educators who wish to create interdisciplinary PBL courses utilizing the 3C3R model. The lessons for each component included:

Content

1. **Meet the family:** Allocate timeslots within class sessions for students to work on their projects. This allows the instructor to provide further support (if needed) for students during their content acquisition journey. In doing so, the instructor can help plant clues if students feel stuck or need further guidance.

2. **Model me this: Consider utilizing a modular approach.** Dividing the course into modules may allow instructors to first provide a sufficient breadth of content and context, followed by students completing their real-life group-based problems. This course comprised of three modules, which helped align and execute the course objectives. The first two modules focused on content and context acquisition, and the last module provided the opportunity for students to complete their real-life PBL projects.

Context

3. **Let's get real:** When possible, present students with real-life problems related to the field of the intended course to maximize the potential for context validity. One student shed light on this by explaining *"it is essential to understand the country of focus [with] a very holistic manner, you cannot scale your innovation without truly understanding the culture..."* (Participant 28). This student reflection highlighted the importance of taking the context of the target population into consideration when creating their intervention to solve their health problem.

4. **Can I get an example?:** Provide in-class case studies for students to get acquainted with examples of previous work and inspire them. This helped one student as they expressed *"I realized how important closing cultural and linguistic gaps are. I analysed studies that showed greater compliance to treatment after incorporating nurses that spoke [the] same language as the target group"* (Participant 12). This student response demonstrated how an in-class example provided them with a greater perspective to addressing language barriers within a health setting.

Connection

5. **Make each layer of your cake different:** Group a diverse range of students who come from various academic backgrounds into the PBL course design, when possible. This may maximize the potential for students to share their area of expertise with each other and facilitate richer discussions to connect the content and context together. One student in particular stated that they learned to *"work in a group with people from a variety of disciplines*" (Participant 20) and another who expressed that *"innovative ideas stem from a variety of different disciplines…. [it] is most effective when many ideas and thoughts from different domains are combined to create an effective solution"* (Participant 30).

Researching

6. **Transformers unite:** Include appropriate website links to each group that are relevant to their problem and incorporate a class session on effective online searching with university librarians. This aims to guide students on their research journey and have reliable sources they can turn to, as well as have the opportunity to conduct further research themselves. University librarians can provide an abundant amount of information to students on their way to becoming scholars themselves.

Reasoning

7. **Complete this survey for a chance to win:** Survey the classroom through a brief questionnaire on their comfort with self-directed learning beforehand, in order to

calibrate the appropriate level needed. Hung (2006) described three levels of self-directed learning within PBL which are teacher-directed, student-directed, and partially student-and-teacher-directed learning. Gauge a sense of what students are comfortable with and give them a challenge that they can feel gratified when they overcome. For inspiration, Khiat (2015), created and validated a self-directed learning diagnostic tool for students in an adult learning institution in Singapore.

Reflecting

8. **How did we do?:** Consider including a self-reflection piece in your course. In doing so, these self-reflections may offer the opportunity for students to reflect on their PBL journey, forge new connections through their reflection entries, and provide further input for instructors to incorporate into future PBL course designs (Ezezika & Johnston, 2023). Students shed light on the personal skills gained from undertaking these projects such as *"teamwork, communication" and leadership skills"* (Participant 16). Another student elaborated that during this project *"we were able to think outside of the box and come up with innovative solutions… [that] improved our group dynamics and I believe that teamwork skills were also enhanced" (Participant 28*).

CONCLUSION

One goal for interdisciplinary educators in higher education is to develop engaging interventions that lead to effective learning strategies for students. Creative pedagogical practices to interdisciplinary learning, such as PBL, can help achieve this goal. Through applying the 3C3R model as a guide into the design, creation, and implementation of an interdisciplinary PBL course, this case study led to eight lessons learned from this journey. It is our hope that these lessons are useful for other educators when designing and implementing PBL courses.

References

AI-Saleem, N. E. (2018). *Historical Development of the Interdisciplinary Studies* [Chapter]. Promoting Interdisciplinarity in Knowledge Generation and Problem Solving; IGI Global. https://doi.org/10.4018/978-1-5225-3878-3.ch014

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education*, 20(6), 481-486. https://doi.org/10.1111/j.1365-2923.1986.tb01386.x

Boon, M., & Van Baalen, S. (2018). Epistemology for interdisciplinary research – shifting philosophical paradigms of science. *European Journal for Philosophy of Science*, *9*(1), 16. https://doi.org/10.1007/s13194-018-0242-4

Braßler, M. (2016). Interdisciplinary Problem-Based Learning—A Student-Centered Pedagogy to Teach Social Sustainable Development in Higher Education. In W. Leal Filho & P. Pace (Eds.), *Teaching Education for Sustainable Development at University Level* (pp. 245–257). Springer International Publishing. https://doi.org/10.1007/978-3-319-32928-4_17

Ezezika, O., & Johnston, N. (2023). Development and Implementation of a Reflective Writing Assignment for Undergraduate Students in a Large Public Health Biology Course. *Pedagogy in Health Promotion*, *9*(2), 101–115. https://doi.org/10.1177/23733799211069993

Garrett, M. D. (2019). Interdisciplinary Learning Communities: Bridging the Gap between the Sciences and the Humanities through Forensic Science. In *Teaching Chemistry with Forensic Science* (Vol. 1324, pp. 109–136). American Chemical Society. https://doi.org/10.1021/bk-2019-1324.ch007

Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology, 66*(3), 325–331. https://doi.org/10.1111/j.2044-8295.1975.tb01468.x

Halpern, D. F., & Hakel, M. D. (2003). Applying the Science of Learning to the University and Beyond: Teaching for Long-Term Retention and Transfer. *Change*, 35(4), 36-41. http://dx.doi.org/10.1080/00091380309604109

Hmelo, C. E., & Ferrari, M. (1997). The Problem-Based Learning Tutorial: Cultivating Higher Order Thinking Skills. *Journal for the Education of the Gifted*, *20*(4), 401–422. https://doi.org/10.1177/016235329702000405

Hmelo-Silver, C. E. (2004). Problem-Based Learning: What and How Do Students Learn? *Educational Psychology Review*, *16*(3), 235–266. https://doi.org/10.1023/B:EDPR.0000034022.16470.f3

Hung, W. (2006). The 3C3R Model: A Conceptual Framework for Designing Problems in PBL. *Interdisciplinary Journal of Problem-Based Learning*, *1*(1). https://doi.org/10.7771/1541-5015.1006

Imafuku, R., Kataoka, R., Mayahara, M., Suzuki, H., & Saiki, T. (2014). Students' Experiences in Interdisciplinary Problem-based Learning: A Discourse Analysis

of Group Interaction. *Interdisciplinary Journal of Problem-Based Learning*, *8*(2). https://doi.org/10.7771/1541-5015.1388

Ivanitskaya, L., Clark, D., Montgomery, G., & Primeau, R. (2002). Interdisciplinary Learning: Process and Outcomes. *Innovative Higher Education*, *27*(2), 95–111. https://doi.org/10.1023/A:1021105309984

Kaplan, S., Milde, J., & Cowan, R. S. (2016). Symbiont Practices in Boundary Spanning: Bridging the Cognitive and Political Divides in Interdisciplinary Research. *Academy of Management Journal*, *60*(4), 1387–1414. https://doi.org/10.5465/amj.2015.0809

Khiat, H. (2015). Measuring Self-Directed Learning: A Diagnostic Tool for Adult Learners. *Journal of University Teaching & Learning Practice, 12*(2). https://doi.org/10.53761/1.12.2.2

Kim, D. H., Jung, J. S., Jung, D. S., Kim, D. H., Jung, J. S., & Jung, D. S. (n.d.). Principles for Creation of PBL problems. *Korean Journal of Medical Education*, *11*(1), 17–23. https://doi.org/1999.11.1.17

Maudsley, G. (1999). Do we all mean the same thing by "problem-based learning"? A review of the concepts and a formulation of the ground rules. *Academic Medicine: Journal of the Association of American Medical Colleges*, *74*(2), 178–185. https://doi.org/10.1097/00001888-199902000-00016

Rinehart, S. D., Stahl, S. A., & Erickson, L. G. (1986). Some effects of summarization training on reading and studying. *Reading Research Quarterly*, *21*(4), 422–438. https://doi.org/10.2307/747614

Savery, J. R., & Duffy, T. M. (1995). Problem Based Learning: An Instructional Model and Its Constructivist Framework. *Educational Technology*, *35*(5), 31–38.

Savin-Baden, M., & Major, C. H. (2004). *Foundations of problem-based learning*. McGraw-hill education (UK).

Stentoft, D. (2017). From saying to doing interdisciplinary learning: Is problem-based learning the answer? *Active Learning in Higher Education*, *18*(1), 51–61. https://doi.org/10.1177/1469787417693510

Tawfik, A. A., Trueman, R. J., & Lorz, M. M. (2013). Designing a PBL Environment Using the 3C3R Method. *International Journal of Designs for Learning*, *4*(1). https://www.academia.edu/7398319/Designing_a_PBL_Environment_using_the_3C3R_Method

Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, *27*(2), 237–246. https://doi.org/10.1177/1098214005283748

APPENDIX – TABLE 1

You have been given $500,000 to create a response that aims to address one of the following health challenges:

1. Potential Ebola Epidemic in Congo or Guinea
2. Acute toxic encephalopathy in India, Vietnam or Jamaica
3. Nutrition Transition in Tanzania, South Africa or Kenya
4. Indigenous health in Canada with a focus on Tuberculosis or Diabetes

In teams of 5-6 students, you are asked to design a response. Each team will focus on one of the aforementioned themes with its own unique economic, geographic, and cultural environments. For this reason, the first step in any successful project will be to develop a thorough understanding of the landscape in which your project will take place.

You will create a report that must include the following:
A brief description of the biological basis of the problem: Describe and quantify the biological aspect of the problem you will address and provide Information/references that outline the biological basis of the problem.

A brief description of what already exists: Describe what other evidence you have been able to find that targets the problem you are aiming to solve. What is the quality of that evidence? Are there any trends worth considering? Are there any theories or frameworks to support this evidence? Include a brief outline of how you chose to approach your country, the unique circumstances in this population, and any evidence that informed the target for your response.

Description of WHAT your response is: How are you responding to this issue? Who are you, and where are you based out of? Who is involved? How does it address some of the needs regarding this health issue? How is your response evidence informed?

Description of HOW your response functions: How does your response "work"? What is the role of your employees, stakeholders, volunteers, or other major constituents? How will your target population access or engage with this response? Do you have a logic model or visual model that can explain how the implementation process will occur? How valuable do you think the government in your target country will find this response? Will they be likely to appreciate this response? What is the feasibility of response plans?

Impact & Evaluation: What will be the impact of your response? What is considered a "successful" response? How will you be collecting data/keeping records to measure and evaluate this "success"? How does your program align with/against other types of responses that exist? What's missing?

Historical & Ethical Considerations: How does your group's social positionality (age, class, race) impact the role your response plays? What do you know about the historical progression of how this issue came to be? What are some of the ethical questions you anticipate will come up in creating this response? Do you anticipate that your response might compromise the comfort and safety of your target population, and how will you address this?

Budget of Expenditures: What are some of the anticipated costs of creating a response like this? Will you be hiring people from different divisions? How many people will you hire to support this response and what will you pay them? Do you expect there to be any upkeep/logistical costs? Do you anticipate your response will make money? If so, how?

Table 1. Description of problem-Based Learning Project for the Course.

APPENDIX - TABLE 2

PBL Project Theme	Project Descriptions
Ackee Poison Prevention Efforts in Jamaica	The idea was to provide educational material regarding the dangers of ackee poison, create an elementary school snack program, and display warning signs in specified sites with ackee fruits. The proposed solution from this group was threefold: to educate school children, as the majority of cases of ackee poison occur in children, implement a seasonal afterschool snack program because snacks high in Riboflavin decrease adverse effects of possible ackee poison toxicity, and to post warning signs near sites that have ackee fruits.
Resolving the Nutritional Transition in Nigeria	The idea was to create a community garden targeted for elementary school students. The proposed solution from this group was to provide elementary school students a hands-on experience with cultivating and maintaining community gardens. The community gardens would have employees that include chefs to guide and coach students how to make culturally adapted and nutritious meals, nutritionists to provide educational workshops on healthy eating, and volunteers such as farmers and community leaders to provide their expertise on sustainable farming practices. Nutritional transition in Tanzania.
Nutritional transition in Tanzania	The idea was to use a gym rewards program to facilitate active exercise and healthy eating. The proposed solution from this group was to implement a gym rewards program within elementary schools, that include trained physical educators to teach seminars and engage in physical activities, and in turn will gain rewards that can be redeemed for healthy delicious snacks.
Nutrition Transition in Kenya	The idea was to create produce kits and distribute them within the community. The proposed solution from this group was twofold, produce a kit that promoted agriculture and education in farming skills and create farming and food utilization classes from farmers. This kit will include seeds of various fruits and vegetables that are suitable for the climate and soil in Kenya, along with educational material on cultivating agriculture. The classes will be held by farmers to educate community members.
Potential Ebola Epidemic in Congo	The idea was to collaborate with healthcare workers and community leaders to educate the surrounding community on the transmission of the Ebola virus. The proposed solution from this group was to work with isolated communities across the Congo to join forces with healthcare professionals, community leaders, and Ebola survivors to educate the public on how Ebola spreads and the benefits of vaccination.

Potential Ebola Epidemic in Guinea	The idea was to ensure that traditional burial practices are carried out safely within Forecariah, Guinea, in order to reduce and minimize the transmission of EVD (Ebola virus disease). The proposed solution by this group was foster community engagement surrounding safe burial practices from community healthcare workers, while simultaneously building trust with family members.
Indigenous Health in Canada (Diabetes)	The idea was to create greenhouses to address access to adequate nutritious foods. The proposed solution from this group was to incorporate multiple greenhouses throughout areas with poor food proximity across high density populations in Indigenous communities. Additionally, community leaders and members would run the greenhouses and allow traditional practices of planting and harvesting.
Acute Toxic Encephalopathy (India)	The idea was to create educational support surrounding acute toxic encephalopathy. The proposed solution from this group was to implement an education and food provision program that consists of two parts: educate a team of trained volunteers and elementary school teachers about safe litchi consumption, and incorporate a food support team of existing local food bank providers near litchi orchards
Acute Toxic Encephalopathy in Vietnam	The idea was to create educational support surrounding acute toxic encephalopathy. The plan was to create an educational program with workshops. The proposed solution was to implement these workshops with the administration of glucose tablets to improve health and nourishments among elementary school children.
Tuberculosis in Inuit communities	The idea was to collaborate with nursing and high school students to address Tuberculosis within Inuit communities. The proposed solution for this group was to partner with nursing students from Nunavut Arctic College to go to homes of patients with an Inuit community leader of a volunteer to provide medication and education regarding the treatment. Additionally, to foster inclusiveness and engagement within the community, high school students from Inuksuk High School can have the opportunity to gain volunteer hours in working with this project.

Table 2. Brief description of each group's proposed solutions to the global public health related problem.