# Tom Mueller

## EDDIE Module

## Module name: **Sustainability Metrics**

## Expected dates of Implementation: **Semester Long**

## Course/Course Format:

**Number and length of sessions per week (e.g. Three 50 minute lecture sessions and one 3-hour lab per week)**

Two sessions per week (1 hour and 15 minutes per session)

**Course Description (From course catalog)**

Course Description - Introduces students to regional differences throughout the world in terms of landforms, climates, soils and vegetation as well as population characteristics and economic activities. Representative areas such as Europe, Russia, Japan and Latin America are developed.

**Course Context: Describe student and/or course level, e.g., lower or upper division, major course, etc. (e.g. "An introductory course for non-majors")**

 An introductory course for majors and non majors.

**Course Goals and Topics (If available, extended version of learning goals and topics covered)**

 The goals of the course are:

1. Increase Students Spatial Thinking
2. Students will become more informed global citizens

The topics include Basic concepts, discussion of Europe, Russia, Latin America, Sub-Sahara Africa, East Asia, South Asia, and Southwest Asia.

##

## Learning objectives

**What learning objective(s) (content) are you planning to address in your course using the selected module materials?**

I am still working on this one. There are a lot of measures used to compare different regions and different countries. The most common is Gross National Product. However, in my class, I try to highlight the Human Development Index, which examines the standard of living (economically), health, and education. By implementing this module, students will be able to examine countries based on sustainability via population, affluence, and technology. This examination hopefully will be able to show the similarities and differences between countries in the overall sustainability metric and in its individual parts. We might be able to discuss the importance of each component.

**Quantitative learning objective**

 Students will learn and discuss the data used in the module for Gapminder. How was it calculated? How is the graph created? **Working with data learning objective**

 Students will learn the origins of the data. Where did the “originally data” come from? Why do we want to use the data in this particular graph?

Briefly describe the pedagogical techniques/strategies you plan to use to facilitate the module and reinforce the learning objectives you identified above.

1. We examined the PowerPoint and discussed each of the components in IPAT - Impact = Population x Affluence x Technology
2. Students will complete some small research on each of datasets used in the module and discuss their findings with the class
3. We will discuss the difference between positive and negative associations
4. In class, we will go through Module A - discussing results, the datasets, etc.
5. The students will complete Module B on their own (in groups)
6. Students will then complete a research project on one country in the Module and present their findings to the class.

## Are you planning on making any adaptations to the materials? If yes, please describe them here. If no, please indicate why. (*This will be important for the end when you make your final product, you will need to distinguish the modifications you made relative to the original*)

 The students have researched the different datasets for Part A - Source, Computation, Strengths and Weaknesses. This Thursday we will complete Part A as a class. Then students will be put into groups and assigned one of the Part B categories.

|  |  |  |  |
| --- | --- | --- | --- |
| **Impact** | **Population** | **Affluence** | **Technology** |
| *Example: CO2 emissions (tonnes/person)* | *N/A\** | *N/A\** | *Example: Energy production, per person* |
| Per capita material footprint (tonnes/person) |   |   | Personal computers (# personal computers/100 people) |
| Per capita sulfur emissions (kg sulfur/person) |   |   | Broadband subscribers (# subscribers/100 people) |
| Plastic percent of waste consumption (% plastic of all municipal solid waste) |   |   | Roads paved (% of total roads) |
| Biomass stock in forest (tons of organic material) |   |   | Cars, trucks, buses (#/1000 people) |

1) Complete research on the Impact and Technology Variables

A) How are the variables computed?

B) How often is the data updated?

C) Strengths and Weaknesses of data

2) Similar to Part A: Describe the overall pattern of the bubbles (i.e. countries) in your graph. Do the patterns follow the IPAT framework? Why or why not?

3) Each group member should describe one country

A) Does it meets the criteria?

B) Please research your country to explain your answer. (Economics, Cultural, Political, etc.)

4) Each group member should research a time period from the graph and examine global conditions.

A) Does it help explain IPAT?

## Do you think you will need to incorporate any supplemental materials with this module? If yes, please either describe what you are planning or include any materials you have already found.

 I gave a lecture on Population Census and Malthus for the Population variable and GDP and Human Development Index for the Affluence part. The discussion picked up a little further after these lectures.

## What assessments are you planning on using to measure student progress? If possible, describe, attach, or provide a link here.

 The first part will be using the sheets provided in the module. However students will be broken into groups and complete a presentation by doing a deeper dive into one of the countries. I am still working on the rubric.

# **Reflection Questions for after your Implementation**

*(Think about what you would like to read about this activity if you came back to it in 2 years)* Suggestions for this section (not all required, and extras always welcome):

Introductory Statement: The summary should start with one line that captures the context in which the module was used. This should be followed by 2-5 sentences that highlight what was particularly interesting about this particular implementation. This could include the setting, schedule, student group, an exceptional success or unusual adaptation of materials

*1) Introduction to Geography is an introductory geography course that teaches geographical concepts by examining different world regions, including Europe, Latin America, South Asia, and Sub-Sahara Africa. The instructor has three primary goals for this class; 1) increase students' spatial thinking skills, 2) have students be informed global citizens, and 3) improve their understanding of human and environmental Interactions. The class satisfies our university's social sciences general education requirement and our multi-cultural general education requirement. The class is taught face-to-face in the Fall and Spring and asynchronous online in the Summer. The class consists of book chapter quizzes, lectures, discussions, and labs. A week before we discuss a region, the students read and complete a book chapter quiz on it, and then the material is reviewed with a combination of lecture and discussion. After the discussion, students complete a hands-on exercise focusing on a particular topic from the region and then discuss their results in class. One of the issues in the course is that most of the exercises are cultural or politically geographically based. The instructor wants to include more human and environment exercises. Students started a little confused but seemed more comfortable with the data and analysis by the end.*

## How did it go? (What went well and why? What adjustments did you need make in real time and why?)

 1) As stated above, the plan for this module changed. Students were having issues understanding variables and the graph itself. I broke down Part A into a few parts. First, we discussed the Population and Income variables. I spent some time discussing the United States Census, Gross Domestic Product, and Human Development Index. This discussion gave the students some background on similar variables. Then I asked students to research at least one Population variable and one income variable. They needed to find – how it was computed, the source, how long it is updated, etc. After this part then, we discussed the graph step by step. After completing this part, the students seemed more confident in Part A module discussions. Then the students were broken into groups and completed Part B within their groups. They were also asked to examine a country and time period from Part B and put all of this information into a PowerPoint presentation.

## Student Outcomes (What did students take away? Where did students struggle the most?)

 A) Students understood the need to research data variables and questions they needed to ask on them. They found data only shows part of the picture, so they needed to dig deeper. THey also realized that not all the countries submit data for several reasons, so this will impact the analysis.

B) Students understood that variables could be defined in a different way (i.e., Technology)

C) They also understood that different “development level” countries may have similar issues.

D) More importantly, they had a better understanding of sustainability.

## Future Use (Would you do this activity again? What suggestions do you have? What would you change?)

 *1) The module is a powerful learning tool. However, I need to bring in more geography. I planned to create an ArcGIS Online lesson to supplement it. However, the data from Carbon Institute was more difficult than expected. I wish I would have had students create a simple graph. I think it would have helped students better understand graphs.*