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| **Communicating with Data**  **Team Research Project** | Image result for infographic |

## Objectives

**Students completing this series of exercises learn to:**

* understand the fundamentals of the scientific process (“scientific literacy”) and the value it can add to solving biological questions
* identify appropriate data and evidence to address a critical research question
* **Investigate existing data resources**
* **Access appropriate data resources**
* **Clean, configure and standardize a dataset**
* **Critically evaluate information derived from a dataset**
* **Analyze and visualize data for effective communication of science**
* Apply scientific and technical knowledge to specific tasks and problems
* Engage in independent learning, critical thinking, problem definition, and problem solving
* Participate effectively in individual and team-related activities
* Apply ethics in the practice of science

**Introduction**

In this module, you are being asked to think like a scientist. This module embraces the concept of experiential learning as a means to integrate knowledge and develop new skills. In this module we will work together to develop research questions, collect data, analyze and interpret results, and communicate knowledge. This includes practicing skills, including critical thinking, creativity, collaboration and communication. You will also be asked to employ your literacy skills relative to information acquisition, media consumption, data acumen, and technology utilization. Learning and literacy skills are critical, but equally important are the life skills including the ability to be flexible, act as a leader in your group, maintain productivity on this research and the course, and practice social skills that foster positive group experiences.[[1]](#footnote-1) The module will emphasizes skills that are essential to carry out interdisciplinary research including teamwork and an understanding of how to work together in diverse groups to achieve a collective goal.

Working collaboratively in teams of 2-4 researchers, you will engage in targeted projects to address critical information and research needs. Your team will use the scientific process to conduct research using data. The final product will be an infographic that uses data visualization to communicate your

science “story.” The infographic will use engaging visuals to quickly and clearly communicate the data and problem complexity.

**Activity I: Investigate Infographics**

**An infographic tells a story using data, information and knowledge communicated as graphic visualizations. Infographics are about communicating information in a quick, clear and visually appealing manner. The best infographics:**

* **stick to a single main overarching point,**
* **rely on engaging visuals (i.e. images, charts, graphs, etc.) and less on text,**
* **derive inspiration from the data,**
* **are consistent in imagery (think of the colors, icons, bullets, complementary fonts, etc.), and**
* **tell one cohesive story with a beginning middle and end.**

1. **Review the assigned infographic and answer the questions below. When you have finished this step, discuss your answers as a team.**
2. **What is the Big Question being investigated in the infographic? What is the “story”?**
3. **What data sources were used? What analyses were completed?**
4. **Does the design of the infographic enhance the story? Are the visualizations effective?**
5. **Overall, is the infographic effective and engaging? Why?**
6. **Fill in the rubric below for the assigned infographic. Discuss your grading as a team.**

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| **Criteria** | **Quality Ranking** | | | | | **Notes** |
| **Figures/Data Visualizations (15 pts)** | **3** | **2.5** | **2** | **1.5** | **1** |  |
| Figures relate to the big question / story |  |  |  |  |  |  |
| Figures are appropriate for the data type and analysis |  |  |  |  |  |  |
| Figures are formatted correctly |  |  |  |  |  |  |
| Figure legends are present and describe the graphic accurately |  |  |  |  |  |  |
| At least 1 figure is provided per team member |  |  |  |  |  |  |
|  | | | | | | |
| **Text (15 pts)** | **3** | **2.5** | **2** | **1.5** | **1** |  |
| Covers topic accurately |  |  |  |  |  |  |
| Covers topic in appropriate depth |  |  |  |  |  |  |
| Properly cites sources |  |  |  |  |  |  |
| Includes interpretation of data presented in figures / graphics. |  |  |  |  |  |  |
| Includes at least 3 relevant and interesting “additional facts” |  |  |  |  |  |  |
|  | | | | | | |
| **Required Elements (10 pts)** |  |  | **2** | **1.5** | **1** |  |
| Big Question is clear and engaging |  |  |  |  |  |  |
| At least 3 of the 4 question types asked[[2]](#footnote-2) |  |  |  |  |  |  |
| At least 2 visualizations use data from publicly available database |  |  |  |  |  |  |
| At least 3 different figure / graphic types |  |  |  |  |  |  |
| At least 1 figure uses environmental data |  |  |  |  |  |  |
|  | | | | | | |
| **Design (10 pts)** |  |  | **2** | **1.5** | **1** |  |
| Good layout with clear story path |  |  |  |  |  |  |
| Engaging additional visuals (pictures, drawings, etc.) |  |  |  |  |  |  |
| Not cluttered or messy |  |  |  |  |  |  |
| Good resolution on graphics (not blurry or pixelated) |  |  |  |  |  |  |
| Proper grammar and spelling |  |  |  |  |  |  |

Notes:

1. **Critique the rubric. What in the rubric needs clarification or explanation to make it better suited to your assignment? Make notes below on what could be added or included. We will revise the rubric together based on your comments and use the revised version for grading your final products.**

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| At least 3 of the 4 question types asked[[3]](#footnote-3) |  |  |  |  |  |  |
| At least 2 visualizations use data from publicly available database |  |  |  |  |  |  |
| At least 3 different figure / graphic types |  |  |  |  |  |  |
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| Not cluttered or messy |  |  |  |  |  |  |
| Good resolution on graphics (not blurry or pixelated) |  |  |  |  |  |  |
| Proper grammar and spelling |  |  |  |  |  |  |

Notes:

**Activity II: Brainstorm a Group Research project**

* 1. **Work with your team to start to define a research question you can pursue this semester. Write your ideas below:**
  2. **Discuss within your team the data you would need to investigate your question. List the data you will need in the space below. Identify possible sources where you think you would be able to access these data.**

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| **Data/information Needed** | **Possible Data/information Source** |
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* 1. **Search the available data resources to see if the data you need are available. You can use the library site [**<http://libguides.cmich.edu/lifesciencedata>] **where many data resources are listed, as well as any other publicly available data source you can find. If the data you need are not available, you will need to return to Step 1 and revise your Big Question. You do not need to fill in this lab packet for any additional iterations. Ask your instructor for help if you keep running into a lack of data.**

**Activity III: Refine your Research Question/Plan**

1. **Write the final one to two sentence research question that will guide your research and data discovery for your project.**
2. **Discuss within your team the data you would need to investigate your question. List the data you will need in the space below. Identify possible sources where you think you would be able to access these data or individuals you will need to ask for this data.**
3. **Assign a team member to research and access each data source data.**

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| **Data/information Needed** | **Data/information Source** | **Team Lead** |
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1. **In the space below, develop a research plan including a list of tasks, who is responsible for each task, timeline for completion of each task, and the final outcomes you anticipate.**

**Activity IV: Create your Data Analysis and Visualization Storyboard**

1. **Identify the analysis and figure type your group plans to use for each set of data you plan to collect. Enter this information in the table below (use as many rows as needed to complete this section).**

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| **Data** | **Analysis** | **Figure/Graphic Type** |
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1. **As a group, outline the story you plan to tell with your data visualizations. Write the story below (you can use diagrams, words or a combination). This is your storyboard. *You do not need full sentences. You do need to be clear and communicate your thoughts and ideas effectively.***

**Activity V: Design the Infographic**

1. **Produce a full draft of the entire infographic. The infographic must “stand alone” and tell a cohesive story while incorporating the individual graphics from each team member.**

The resources below are excellent videos about best practices for making infographics.

Pictochart tutorial. <https://www.youtube.com/watch?v=Eq-85gzw3GI>

What makes a good infographic? <https://www.youtube.com/watch?v=nLxQAa5Sras>

Types of Infographics. <https://www.youtube.com/watch?v=j_O5FxO_DRk>

Steps to follow before creating your infographic. <https://www.youtube.com/watch?v=IpLXzOfBNJ0>

How to design your infographic. <https://www.youtube.com/watch?v=4EwDNokZvCE>

How to create persuasive charts and graphs. <https://www.youtube.com/watch?v=ZYJuw-hQ-lE>

**Here are several example websites you can use to make your infographic.**

<https://piktochart.com>

<https://infogram.com>

<https://venngage.com>

<https://www.canva.com>

1. Write an accompanying narrative that explains the “story” you are telling in your infographic. In the narrative include the following:
   1. The title of your infographic
   2. One to two sentences describing your big idea/question/problem.
   3. A written narrative that can help explain the infographic. The narrative is to help the instructor review the infographic relative to the intent. The narrative should be less than 2 single-spaced pages.
2. Use the rubric to self-grade your infographic. Turn this in with your infographic and narrative.

**Activity VI: Revise your Infographic**

1. **Revise your infographic based on the feedback provided by your instructor. This is the culmination of the work you have done individually and as a team over the semester. Be sure you address the edits and comments provided by the instructor. This will be graded based on the final product using the rubric your group approved.**

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1. To learn more about 21st Century skills go to: <https://www.aeseducation.com/career-readiness/what-are-21st-century-skills> [↑](#footnote-ref-1)
2. Question types: **Questions about the variability of a group of data points; Questions that compare two or more groups; Questions that ask if two variables are correlated; and Questions that ask how a total is proportioned into subgroups.** [↑](#footnote-ref-2)
3. Question types: **Questions about the variability of a group of data points; Questions that compare two or more groups; Questions that ask if two variables are correlated; and Questions that ask how a total is proportioned into subgroups.** [↑](#footnote-ref-3)