Using EM to Drive Effective Data Visualization: Instructor Guide

### Workshop learning objectives

After completing this workshop, students should be able to…

* Understand the importance of identifying opportunities relevant to research and business goals from data collected and analyzed throughout the research process
* Evaluate the effectiveness of different types of data visualizations
* Learn key data visualization principles and techniques behind creating effective and meaningful visualizations
* Demonstrate the ability to communicate insights from data visualization to stakeholders and using those insights to drive informed decisions
* Recognize ethical considerations that are relevant to data gathering and data visualization

### Workshop structure

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| **Activity** | **Recommended time** |
| Introduction and welcome statement | 1-2 mins |
| How data relates to EM | 10 mins |
| Activity 1: What Kind of Graph Do I Use? | 15 mins |
| Sample Walkthrough of Data Visualization | 5 - 10 mins |
| How to make data stand out in a graph | 5 mins |
| Activity 2: Brainstorming/Review Questions | 10 - 20 mins |
| Activity 3: Examples of Data Visualizations | 10 - 20 mins |
| Total | 60 - 90 mins |

**\*Note: Based on the time and the goal of your workshop you can run both activities 2 and 3 or just run one of them.**

### Preparing for the workshop [approximately 2 hours prep time]

* Reserve a space for the workshop and advertise to students. The workshop as outlined below can be completed in 1 hour but can be adjusted by facilitators as needed.
* Students do not need to complete any pre-work for this workshop, but they do need to bring a data set from their own research (if applicable) that they could easily graph.
* Students should bring their laptop, **OR** the facilitator should print paper copies of the student slide deck and resources document.
* Students or the facilitator should bring colored pencils or markers to class.
* Designate a workshop facilitator. The facilitator will use this instructor guide, supplemental materials, and the provided slide deck to guide students through the workshop activities and encourage discussion.
* The facilitator should review the following documents in advance of the workshop
* The KEEN Framework: A Guide for Entrepreneurial Mindset (if the facilitator is not already familiar with this framework)
* Instructor Slides, including notes section
* Optional additional reading
  + The Storytelling with Data team has a website that includes a useful blog and exercises that you can go through to practice:<https://www.storytellingwithdata.com/>
  + To review best practices for different types of graphs, use this link: <https://www.storytellingwithdata.com/chart-guide>
* Upload the student slide deck and student resources document to a location that will be accessible to students (Google drive, LMS, etc.), or print hard copies to share with students.

Day of the workshop [approximately 1 hour]

As students enter the classroom, ask them to download the student slide deck and additional resources document (or hand out these documents if they are in hard copy).

The workshop is guided by the facilitator using the Instructor Slide Deck. **Suggested questions and organizational notes for the facilitator are in the notes section of each slide.**

Slides 2 - 5: The goal of these slides is to help students see how their data could be relevant outside of their direct research. Discussion/Activities should relate to how it could be connected to entrepreneurial opportunities and used to help narrow down opportunities, evaluate feasibility of solutions, convince people of particular solutions to problems, and communicate at every level of analysis. Students will be asked to consider Marty’s data and their own.

Slide 4: At this point, you should play the video, although you will play the very beginning of it (stopping at 1:15 after the narrator asks what additional data Marty should collect), ask students to discuss, and then finish the video. Suggested questions and organizational notes for the facilitator are in the notes section of each slide.

Slides 6 - 22: The goal of these slides is to help students recognize that data can be visualized in many different ways. Rather than choosing the default graph suggested by Excel or other programs, students should learn the strengths and weaknesses of different graphs. They also need to consider their audience’s comfort level with the graph and how clearly/simply the graph can communicate the information.

* The activity on Slides 6 - 8 provides a specific (simple) data set. Students will be asked to brainstorm possible graph types and then to graph the data. Drawing simple graphs on paper is perfectly acceptable. Students can always take pictures of their graphs and post those pictures into the student slides.
* Slides 9 - 22 walk the students through the creation of a graph similar to one used in the video. Instructions for what to discuss on each slide are on the slides themselves or in the notes.

Slides 23 - 26: These slides cover different ways to emphasize information in graphs. Discussion/Activities should relate to how to focus attention on graphs and how effective they find these methods.

Slide 27 - 29: Review and continuation [15 minutes] The goal of these slides is to apply what they have learned in the workshop and in the previous activities. They can do this individually or in small groups, and each of the three slides provides options for both the students and the facilitator. It is not necessary to do all three activities.

* In Slide 27, students that are involved in research can brainstorm about their own data, considering and more specifically applying their thoughts from slide 2.
* On Slide 28, students can use their own data (as brainstormed in the previous slide) or the Patient-reported pain example from slides 6 - 7 for the activity.
* Alternately, students can break up into small groups and look through one of the example data visualizations listed on slide 29. Have students report back - what do they think of these visualizations? How impressive are they? How useful are they?
* The workshop can end with a report out from a few individuals or 1-2 small groups and discussion of their final activity and what they have learned (as time allows).

### Alternative formats

The workshop materials are designed to be easily adapted for virtual format, for reaching remote research students or for delivering the contents to students across multiple universities at once. For that case, the facilitator preparation will include sending meeting links for the remote workshop and setting up breakout rooms for the final discussion sessions.