

Teacher's Guide for MIT BLOSSOMS Project-Based Learning Unit:
Flaws of Averages

Welcome to an exciting learning experience for your students and for you! This multi-week Project-Based Learning (PBL) unit focuses on averages, what they mean and how they can be misleading. We want the students to become sophisticated “consumers” of any and all documents or conversations that use the term “average,” always knowing what follow-on questions to ask – to assure full understanding.

But the unit is much more than that. Building from the analysis of “averages”, the students – in small teams – will select one of several community-based safety projects we post here. Preferably, each team will have a different project. And the allowable projects are not constrained to the ones we describe here; with your advice and assistance, the students in a team can design their own project. Each community-based project deals with a local community issue:

1. Fire Safety and Distance to Nearest Fire Hydrants
2. Drivers' Intersection Safety
3. Smart Traffic Lights
4. Sidewalk Safety
5. Playground Safety
6. A “None-of-the-Above” Project, negotiated between Student Team and Teacher

Each project has a two-page description for the students, giving them the subject matter and goals of the project. Each project will require the students to collect original data from their community, data that are obtainable by unobtrusively observing the system(s) under study. In each instance, the idea is to assemble and integrate the data, display in histograms, compute averages (means), modes and medians and ultimately to make inferences that could benefit the community. In assembling their data, the students should also feel free to take and share photographs of scenes or objects that illustrate what they are measuring and reporting.

The project experience is designed to be much more than an exercise in averages and their limitations. It is to enable the students to work collaboratively in teams, to divide their work equitably, to design certain aspects of their work that are (intentionally) not spelled out in detail in the project write-up, and ultimately to present their findings to community professionals whose responsibilities include the topic the students have examined. In the best of cases, one or more student recommendations could be implemented by their community. Please note: We do not expect that to happen on a routine basis, and you can eliminate this element if you feel it will be too difficult to achieve in your community.

In this PBL web site, we suggest day-by-day topics and activities for the students, which you are free to adapt to the needs of your class. In the first two weeks, some of this will require presentations from you, the teacher. An example is the material on histograms and distributions. After this phase-in period, the student teams should work on their own, design

their project, scheduling their activities, assigning responsibilities, holding regular Team review meetings, etc. They are likely to have questions, and you are their coach and mentor.

In the final week, the ideal sequence of “deliverable” events is this: (1) the student team is invited by local government professionals to present their work and to seek feedback; (2) the Team drafts and submits a ten-page final report with slides, histograms, distributions and photos; and (3) the Team presents their work at the [Final Event](#) . If the Team is unable to present their work at a government location, an alternative is to invite one or more government professionals to the [Final Event](#) presentation. You are to grade the entire project, taking into account the multiple dimensions of the work.