

Points of Emphasis in M112

In a typical instructional unit on two-variable statistics, emphasis may be placed on students' ability to fit a line to plotted points and memorize the phrases "positive correlation," "negative correlation," and "no correlation." In many cases, students apply these skills to scatter plots that may not have any indicated contextual meaning. By contrast, in M112 students should come to see fitting lines and describing patterns of association as valuable tools for modeling; they should reason, calculate, and interpret using real data as much as possible. Specifically, students in M112 should:

- regularly encounter real-world contexts and be given opportunities to develop and investigate statistical questions (LP 1).
- engage with multiple parts of the modeling cycle (see above), especially using tools such as scatter plots and curve-fitting to answer questions about the world (LP 1).
- be able to choose tasks that are organized around different scientific, social, or other topics that connect to two-variable measurement data, allowing students to have agency in their learning (LP 4).
- frequently collaborate and share their questions, models, calculations, and conclusions (LP 2).

In a typical course on two-variable statistics, students might focus on the technical aspects of constructing scatter plots manually or calculating correlation coefficients by hand. Instead, in M112, students should spend ample time interpreting, analyzing, and reasoning about scatter plots, using curves fitted to the data when appropriate. Specifically, students in M112 should:

- regularly engage with tasks that do not require any computation, but instead focus on understanding and reasoning. For example, students should:
 - describe patterns visible in scatter plots;
 - explain the meaning of patterns of association, with care to distinguish between correlation and causation;
 - informally fit straight lines to data;
 - use curves that have been fitted to data to answer questions about the relationship being modeled;
 - reason about the appropriateness of models using correlation coefficients or residuals;
 - explain insights gained from analyzing two-variable measurement data and limitations of curves fitted to data (LP 3).
- have opportunities to share their reasoning with partners or in groups, allowing for practice sharing, critiquing, and revising their arguments and including social interaction as part of the learning process (LP 2).

Instead of focusing only on the applications typically associated with statistics in school (e.g., correlations between height and armspan or level of education and income), students should also be given opportunities to understand and reflect on the ways that statistical modeling can authentically involve real-world situations and create compelling arguments for change (LP 6). Some contexts to consider include:

- the relationship between industrial practices and climate change;

- factors associated with reduced access to high quality health care.

Students should be given frequent opportunities to use software to aid in calculating correlation coefficients, constructing scatter plots, and curve-fitting; these uses allow students to focus on understanding, explaining, and reasoning about data (LP 7).