Outcomes
- To learn how graphical representations of data can be misleading
- To learn how to interpret data from graphs and tables
- To raise some equity issues related to the study of mathematics and college attendance by examining and interpreting data
- To practice interpreting data and making recommendations based on it

Overview
This session is intended to help participants become aware of misleading data that they may see in the news media or in advertisements. It gives participants experience in examining real data that will raise some equity issues.

Time

10 minutes	The beginning activity briefly processes the at-home activity from the last class.
50 minutes	A sample state assessment item from California is used to introduce making interpretations from data. Alternatives from other states may be substituted. This activity and the next introduce how graphs may be misleading. In the second activity, participants have to decide what is misleading and redraw the graph to better represent the data given.
50 minutes	The final two activities involve participants in looking at real data connecting gender to careers and connecting college attendance to mathematics. This serves to culminate the class, as this is a major use of statistics in everyday life.
10 minutes	The remaining class time may be used for celebration, recognition and evaluation.

Materials

Facilitator	Transparencies (English & Spanish)
	BLM 38: Quality Drinks Problem *BLM 39: Quality Drinks Multiple Choice* *BLM 40: Length of School Year* *BLM 42: Degrees Earned by Women Table* *BLM 43: Curriculum in Mathematics Problem* *BLM 44: Instructions for Presentations*
Participant	**Handouts (English & Spanish)**
• Graph paper, two pieces for each person • Chart paper, one piece for each group • Rulers, one for each person • Color pencils, one box for each group	**One per participant for class** *BLM 38: Quality Drinks Problem* *BLM 39: Quality Drinks Multiple Choice* *BLM 40: Length of School Year* *BLM 41: Degrees Earned by Women Problem* *BLM 43: Curriculum in Mathematics Problem*

Activities

Preparation of Classroom	Notes
1. There is not a lot of preparation for this lesson. 2. An optional activity for this lesson would be to gather samples of state assessments in your state and help participants read and interpret them. 3. Consider how you want to end the course, perhaps with a certificate of completion or some sort of celebration.	This lesson is intended to synthesize concepts covered in the course and apply them in situations in which participants may see them used. You might introduce this lesson by discussing how data and statistics can be used to mislead or misrepresent information. So a well-informed person needs to know how to interpret data in tables and graphs and know when things are distorted.
Discussion of Homework (10 minutes)	
Share one or two graphs from family data and compare to the class's scatter plot of height vs. head size. Discuss why the family graph might be different.	There should be a wider distribution of ages within a family than within the class.
Misuses of Statistics (50 minutes)	
1. Introduce this lesson by telling participants that statistics like they have been studying can be very powerful tools for influencing others. It is important to understand how statistics can be used and misused by industry. The subject of this lesson is just that: the use and misuse of statistics. 2. Hand out the **Quality Drinks Problem** and display the transparency. Have participants discuss this problem in small groups for about 10 minutes, then discuss with the whole group. 3. The **Quality Drinks Multiple Choice** handout and transparency are optional if you want to use them.	The following problem is adapted from a sample item from the California High School Exit Exam. I would present it as an open-ended item without the multiple choices but it can be used as multiple choice if you prefer authenticity. If used as an open-ended item, I would ask participants to find a way to fix the claim so it is not misleading. Have different possibilities presented by participants and discuss merits of each. You might want to substitute a similar example from your state assessment if released items are available. This claim is misleading because at first glance, Quality Drinks has many less injuries. However, when proportional reasoning is used, Best Drinks averages 20 injuries per year, while Quality Drinks averages 50 injuries per year.

Activities

Misuses of Statistics, continued	Notes
4. Distribute copies of the **Length of School Year** and also display the transparency on the overhead. 5. Ask: *What information were you able to get from this graph?* *What is misleading about this bar graph?* 6. Suggest groups decide on a way to redraw the graph so that it better represents the data given. Give participants graph paper, rulers and colored pencils and have them redraw the graph starting the vertical axis at zero and scaling up from there. 7. Have a volunteer hold up his/her graph for everyone to see. If you see more than one way to graph this, have them share. 8. Ask them how the new graph differs from the original. How is scaling used to influence one's thinking?	The vertical axis does not start at zero. The graph seems to show that Japanese children go to school about 3 times as many days as do US children.

Uses of Statistics (50 minutes)	
1. Hand out the **Degrees Earned by Women Problem** and display the transparency. 2. Have participants read the questions and discuss them in their groups. Ask for some responses to the questions. 3. Have participants construct a double bar graph (if time permits), then have one put on the overhead projector. Ask participants what the advantages of a double bar graph are. Don't spend too much time on this so you can get to the last activity. 4. In small groups, have participants examine the tables in the **Curriculum in Mathematics Problem** handout. Display the transparency on the overhead. Ask participants to choose any way they want to summarize the information (graph, words, etc.). Say: • *If you were going to make recommendations to the local school board about curriculum in mathematics, what might you say?* • *How would you justify your recommendations?*	Allow about 15 minutes for participants to construct a graph and answer the questions, The data for this activity are taken from a national sample from the High School and Beyond Study and formed the rationale for the College Board's Equity 2000 Project, emphasizing algebra for all. * Pelavin, S.H. & Kane, M. (1990). *Changing the Odds: Factors Increasing Access to College.* NY: College Entrance Examination Board.

Activities

Uses of Statistics, continued	Notes
5. Display **Instructions for Presentations** and explain what is expected from each group. 6. Have groups report their summaries and recommendations as time permits.	
Celebration (10 minutes)	
1. Use the remaining time to hand out certificates or celebrate in any other way the class might desire. 2. This time can also be used for a course evaluation.	

Sessions One to Eight

Transparencies
and
Handouts