

Title

Just the Stats: Data Analysis for Grades 6–8

Target Audience

This course is intended for pre-service and in-service 6-8 teachers.

Course Description

This course is designed to bring learners up-to-date on the most effective ways to teach data analysis to middle school students. Learners will explore technologies—such as computer software, the Internet, and calculators—for use in the classroom, as well as how these technologies assist students in the study of data analysis. Learners study not only how to teach data analysis, but also data representation. Online discussion boards allow learners to collaborate with one another when developing ideas. As a final project, learners will craft a set of data analysis lessons that integrates the use of technology by both the teacher and the students. This course adheres to the guidelines and expectations set forth by NCTM.

Instructor/Facilitator

See instructor/facilitator sheet

Credits

To be determined by college or university

Objectives

Learners will:

- Review and develop an understanding of the student expectations promoted by NCTM for data analysis in grades 6-8.
- Implement the NCTM standards for teaching data analysis.
- Experience and appreciate the advantages of Web-based activities in lesson plans on data analysis.
- Learn to evaluate and select appropriate Web-based activities related to data analysis.
- Develop an appropriate set of data analysis lessons to be implemented over three class periods that integrates the use of technology.

Outline of Content and Assignments

A summary of course content and assignments is outlined below. Details for each assignment, including locations of readings and complementary Web resources, are included in each session of the Course Content. The final project is detailed in the last session of the course.

Session 1: Review the NCTM Standards for Teaching Mathematics

Learners will:



Read

- "Critical Response Skills"
- NCTM standards for Data Analysis and Probability
- NCTM standards for Data Analysis and Probability Grades 3-5
- NCTM standards for Data Analysis and Probability Grades 6-8
- "Introduction to Descriptive Statistics"
- "Harcourt Animated Math Glossary"
- "Statistics Glossary"

Record in the online journal

Log your answers to the following questions:

1. As you read the excerpt, make a list of the elements you want to see in student data analysis projects. This list will become your reference as you help students develop data analysis projects and as you assess their work.
2. As you read the three articles, identify the underlying skills that should be developed as students study data analysis in grades K-12.
3. While at these two Web sites, compare other terms that are of interest to you and log in your online journal which glossary you prefer and why.

Participate in the online discussion

Discuss which critical response skills you want to focus on with your students as they learn to analyze data.

Session 2: Analyze Data Using Calculators

Learners will:

Read

- "The Technology Principle"

Review Lesson Plans

- "Something Fishy"
- "Alphabits"

Watch videos

- "Something Fishy"
- "Alphabits"

Record in online journal

After completing the readings and videos, log your thoughts and answers to the following questions:

1. Write a short rationale to defend the use of calculators by students when studying data analysis.
2. What mathematical understandings and skills are required of your students in order to successfully complete this simulation?
3. How will you address the variability in your students' responses as they estimate the number of fish in the population?
4. What questions will you ask your students in order to facilitate the development of a process for estimating the total number in a population without having to count the entire population?
5. How will the estimate of a population be affected by the size of the sample taken and tagged?
6. How would you model the capture-recapture process to help students who are having difficulty understanding how it is used to estimate the number in an entire population?
7. How will you help students interpret the meaning of the number of tagged items relative to the total number in a sample that has been taken?
8. What strategies do you think your students will use to solve proportions?



9. What recording strategies will you encourage your students to use to facilitate compiling the class set of data?
10. For which part of the data analysis will the calculator be most useful?

Participate in the online discussion

Share ideas and solutions to the following questions:

1. How will you address issues of students conceptually understanding the process of data analysis and the rote manipulation of the numbers?
2. What are the benefits of allowing students to devise their own system of organizing the data?
3. Pick a topic that you think would be of interest to your students. Write a question that can be addressed by collecting, organizing, and displaying data.

Session 3: Analyze Data Using Graphs

Learners will:

Review lesson plans

- "Wet Heads"
- "Steppin' Out"
- "Comparing Calories in Fast-Food Burgers and Chicken"

Watch videos

- "Wet Heads"
- "Steppin' Out"

Explore computer activities

- "Stem-and-Leaf Plotter"
- "Boxplot"

Explore Web resources

- Introduction to Math and Spreadsheets
- Spreadsheet Lessons: Graphs using ClarisWorks or AppleWorks
- AppleWorks Spreadsheet Tips
- Microsoft® Excel 97 Tutorial
- Internet 4 Classroom, "Using Excel in a Classroom"
- Create a Graph
- Making Scientific Graphs with Microsoft Excel
- Representing Data

Record in online journal

1. A key that defines an entry in a stem and leaf plot helps the reader understand the displayed data. Design a "key" that you would attach to a stem and leaf plot that would clarify the meaning of an entry.
2. How would you explain to your students that, even though each piece of data is two digits, their entry into the stem and leaf plot is represented by one digit?
3. Under what circumstances would you recommend that your students use a stem and leaf plot to help analyze data?
4. What are the five critical entries needed to make a box-and-whisker plot?
5. What questions can be answered by interpreting a box-and-whisker plot?
6. What changes would you make to the human box-and-whisker plot to enhance its interpretation?
7. How would you make use of a stem and leaf plot to facilitate making a box-and-whisker plot?

8. What questions would you ask to gather a sense of how well your students are able to interpret the comparison of the data displayed in two box plots? What are some of the responses you would expect?
9. As students change their data, what questions will you ask to check their comprehension of the effects their data change will have on the appearance of their graph?

Participate in the online discussion

1. How do you plan to structure your classroom as you implement the use of technology in your lessons on data analysis? Consider the resources you have available and what you would like to have available.
2. Students will have a wide variety of graphs at their disposal when they use computer software. What criteria will you use to determine if the students have chosen an appropriate display for their data?

Session 4: Use the Web to Locate Ideas for Your Curriculum

Learners will:

Explore Web sites

- Guidelines for Evaluating Web Sites
- NCTM standards for teaching mathematics
- The Math Forum
- The Gateway to Educational Materials
- PBS Teacher Source: Math
- Algebra/Graphing/Statistics Learning Units
- TrackStar
- The Data Library
- Information Collection and Analysis
- Public Discussions at The Math Forum
- Teacher Talk
- "Ask Dr. Math"
- "Quandaries and Queries"

Record in online journal

Web sites that look useful to you. Record the URL, along with a few notes.

Participate in the online discussion

1. Post the activity or lesson you have chosen as well as the online resource to the Discussion Board.
2. In the same posting, provide the criteria you used for your selection of the supporting online resource and include the rationale for its support of the NCTM Standards.
3. Be sure to check the Discussion Board to read and comment on what your classmates have written.

Session 5: Develop Your Final Project

Learners will:

Complete the following final assignment:

1. Develop an appropriate data analysis lesson, that can be implemented over three class periods, that integrates the use of technology.
2. Identify the NCTM Standards for Data Analysis and Probability that are being addressed in your lessons.

3. Create objectives for the lesson that focus on what your students will know and be able to do when they are finished.
4. Create pre- and post-assessments for your students to help you plan your course of instruction. The assessments should allow you to determine what your students have learned as a result of your instruction and their involvement in the lesson.
5. Create a remediation activity for those students who do not meet the lesson objectives.
6. Create an extension activity for those students who meet the lesson objectives.
7. Implement your lesson.
8. Write a 2-3-page paper that describes the lesson or unit, lists which standards are being addressed, and explains pedagogical strategies used in the lesson. The paper should:
 - a) Describe what went well and what changes should be made
 - b) Explain what criteria are used to choose the technology that is integrated into the lesson
 - c) Observations you made about your students' learning — from the students' point of view, discuss what areas they were having difficulties with and what areas they found easier.
 - d) Provide student work samples and capture student comments about their learning experience
 - e) Indicate what type of gains students made from the pre- to the post- assessment given

Talk about it

Post your paper lesson plan on the online discussion board. Then reflect back on one fellow learner's work, focusing on suggestions for improvement or remediation and extension activities.

Schedule

This course is scheduled to take approximately 15 hours to complete readings, activities, video, assignments, reflections and a final project.

Requirements

Learners are expected to:

- Complete all assignments
- Maintain an online journal
- Participate regularly in discussion boards

Materials (hardware, software, plug-ins)

Technical Requirements

- Word processor
- Internet service provider
- Email

Academic Dishonesty Policy

To be inserted by university institution only



Evaluation

This course is evaluated on a letter grade basis, and may be available for graduate credit. See graduate credit details pertaining to specific graduate credit institutions.
