Connecting the dots from “Hand Outs” to Research-based Pedagogy: the SERC Pedagogic Service

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# ActivitySheets

A one-page description of a teaching activity that includes links and downloadable materials.

- Title
- Authors/Institutions
- Summary Description
- Learning Goals
- Context for Use
- Description and Teaching Materials
- Teaching Notes and Tips
- Assessment
- Resources and References

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### Body Measures: Exploring Distributions and Graphs Using Cooperative Learning

This page authored by Cary J. Roseth, based on an original activity by Jon Garfield. Cooperative learning information is based on the work of David A. Jonassen and Roger T. Johnson. Jonassen, Garfield, Johnson and Johnstone are all at the University of Minnesota, Twin Cities Campus.

This material was originally developed through CAUSE as part of its collaboration with the SERC Pedagogic Service.

#### Summary

Using cooperative learning methods, this lesson introduces distributions for univariate data, emphasizing how distributions help us visualize central tendencies and variability. Students collect real data on head circumference and hand span, then describe the distributions in terms of shape, center, and spread. The lesson moves from informal to more technically appropriate descriptions of distributions.

#### Learning Goals

There are four student goals for this lesson:
1. Introduce distributions for univariate data, emphasizing how distributions help us visualize central tendencies and variability.
2. Informally describe distributions in terms of shape, center, and spread.
3. Use technically appropriate language to describe distributions.
4. Consider different sources of variability, including measurement error and individual differences.

#### Context for Use

This activity:
- Is appropriate for the beginning of an introductory statistics course.
- May be adapted for junior high, high school, and college-level instruction.
- Is most effective with class sizes of 15 or more students.
- Lasts 60 - 75 minutes.
- Can be easily adapted to emphasize (1) sources of variability, (2) measurement protocols, (3) mean difference and regression analysis.

#### Description and Teaching Materials

This activity:
- Assumes that students are familiar with data entry and a statistical software program (e.g., Excel, R, RStudio, SPSS, Minitab, etc.).
- Uses materials: (1) tape measures, (2) statistical software

#### Teaching Notes and Tips

Helpful Hints:
1. We encourage instructors to begin this lesson with a "hook" of questions that makes the lesson relevant, fun, and intriguing. Sample questions include:
   - Are college students all the same?
   - Are students enrolled in this course pretty similar?
   - Do some students have bigger heads than others?
   - Do some statistics students have bigger hands than others?

2. Time permitting, this lesson may be concluded by considering the what the following graphs would look like. Consideration of these graphs may also serve as a review activity the day after this lesson is used.
   - Salaries of all persons employed at this at this school (university, etc.).
   - Grades on an easy test.
   - Grades on a difficult test.
   - Amount of times freshman students study the first week of class.
Pedagogic Modules
an introduction to an effective engaging teaching technique.

5-10 pages describing:

• **What**  Description of how the technique works.

• **Why**  Evidence about its effectiveness and when it’s appropriate.

• **How**  Making it happen. Doing it well.

• **Resources and References**  An entree into the literature.

• **Example Activities**  Taken from real classrooms.
Partnerships

Digital Libraries
Institutional Partners
Education Projects
Provides a view into the sum of the collection from the partner projects:

- 60 Teaching Methods
- 1100+ Activities
- Research on Learning Bibliography

http://serc.carleton.edu/sp/
Site Use

Although the site content is largely duplicative across partner sites we see increased overall traffic to library content with each new partner.

600,000 visitors to library content over the last year.
15% of traffic to pedagogic modules is through partner sites.
Google preferentially drives traffic to the longest standing url.
Evaluation of Impact

- Users
- Contributors
- Partners
Evaluation Methods

• Surveys
  • Pop up survey of intense users
  • Survey of all contributors

• Case interviews
  • Partners
  • End users (identified through pop up survey)
Interdisciplinary range of users
Impact of Resources

• Why do they come to the site?
• What do they find on the site of value?
• How does it impact teaching?
Why Do They Come to the Site?
What Do They Find on the Site of Value?

• Find something tangible to grab and use (teaching activity).
• Find supportive context to guide teaching and support student learning.
• Support changes in teaching approach to more student-centered and interactive.

“Usually I’m looking for either specific examples, I have something that I know I want to do and I’m looking for data or ideas about how to do it, or I have something that I am already doing and I’m looking to improve the ways that I do it. So those are usually the two reasons why I visit the site.”
Why do they return to the site?

• Teaching tips from others: “show how to pull it off”
• Reviewed “I feel pretty comfortable that it's been vetted by someone who knows something.”
• Structure of teaching activity sheets supports “at a glance decision-making.”
• Quality “It’s improved the quality of the activities and the, and some of the materials that I have students do. It has given me multiple perspectives on ways to teach things.
• What, how, and why behind the pedagogic modules.
How Does it Impact their Teaching?

They gain:

- Inspiration to develop teaching activities using new pedagogy
- Confidence in adopting new teaching methods
- Connection to broader community of faculty who care about science education

You might not notice a huge difference from class, in some, but certainly there’s that class that I put together where you would notice a lot more activities, a lot more things to do, and a lot less of me lecturing. And the number of activities at the SERC website made that possible.
Review Leads to Stronger Activities

• Clarified importance of goals in activity design
• Reflected on characteristics of strong activities (e.g. motivate, practice, reflect)
• Improved activities through small group brainstorming and reflection

“It required me to think about, clarify, and articulate my activity and it’s goals to others, which has helped me think about other activities in my classes as well.”
Valued by Contributors

- Improved own teaching and understanding of pedagogy
- Opportunity to give back to community
- Provided strong mechanism for dissemination – 96% of contributor survey respondents had been contacted by a user of their activity or module
Value to Partners

- Improves and broadens dissemination for partner libraries
- Workshop based activity review improves the quality of activities, generates content and connects partners to new contributors.
- Allows partners to offer enhanced materials to their members
- Pedagogic Service supports sharing of resources and increases use.
In Sum

• Teaching tips and the connection to broader pedagogic considerations help educators visiting the site bridge between a specific activity on the site and their own teaching practice.

• Contributors get a new perspective on their own teaching and find the experience valuable.

• Provides partners with a model for engaging their community in discussion and sharing around effective teaching.