

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

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# Pedagogy in Action


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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 Joan Garfield. Cooperative learning information is based on the work of David W. Johnson and Roger T. Johnson. Roseth, Garfield, Johnson and Johnson 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 50 - 75 minutes.
- Can be easily adapted to emphasize (1) sources of variability, (2) measurement protocols, (3) mean difference and regression analyses.

### Description and Teaching Materials

This activity...

- Assumes that students are familiar with data entry and a statistical software program (e.g., Excel, Fathom, SPSS, Minitab, etc.).
- Uses materials: (1) tape measures, (2) statistical software [Detailed lesson plan for "Body Measures: Exploring Distributions and Graphs Using Cooperative Learning."](#) (Acrobat (PDF) 93kB Oct13 06) [Student activity sheet: Head Circumference CL](#) (Acrobat (PDF) 18kB Oct12 06) [Student activity sheet: Hand Span CL](#) (Acrobat (PDF) 17kB Oct12 06) [Student activity sheet: Body Measures Group CL](#) (Acrobat (PDF) 16kB Jun30 06)

### Teaching Notes and Tips

Helpful Hints:

1. We encourage instructors to begin this lesson with a "hook"â€”questions that make 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 statistics 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 freshmen students study the first week of class.

## 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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## Gallery Walk

Compiled by [Mark Francek \(more info\)](#) at [Central Michigan University \(more info\)](#)

### What is Gallery Walk? --a discussion technique for active engagement

Gallery Walk gets students out of their chairs and actively involves them in synthesizing important concepts, in consensus building, in writing, and in public speaking. In Gallery Walk teams rotate around the classroom, composing answers to questions as well as reflecting upon the answers given by other groups. Questions are posted on charts or just pieces of paper located in different parts of the classroom. Each chart or "station" has its own question that relates to an important class concept. The technique closes with a oral presentation or "report out" in which each group synthesizes comments to a particular question.

[learn more here](#)

### Why use Gallery Walk? --promotes higher order thinking, oral/written presentation skills, and team building

Gallery Walk is flexible and has many benefits. Gallery Walk can be organized for a simple fifteen minute ice breaker or for a week long project involving graded oral and written reports. The technique encourages students to speak and write the language of earth science rather than just hearing it from the instructor. In addition to addressing a variety of cognitive skills involving analysis, evaluation, and synthesis, Gallery Walk has the additional advantage of promoting cooperation, listening skills, and team building.

[learn more here](#)

### How to use Gallery Walk? --student teams rotate between posted charts



In Gallery Walk student teams rotate to provide bulleted answers to questions posted on charts arranged around the classroom. After three to five minutes at a chart or "station" the team rotates to the next question. Gallery Walk works best with open ended questions, that is, when a problem, concept, issue, or debate can be analyzed from several different perspectives. In this section find a variety of instructional resources such as preparing students for this technique, a step by step guide for using Gallery Walk, evaluation rubrics, and challenges in implementing the technique.

[learn more here](#)

### Gallery Walk examples --a variety of sample questions for a variety of earth science topics

Find examples of Gallery Walk questions for the following categories: Atmosphere, Biosphere, Climate System, Earth History and Time, Earth Surface, Energy and Cycles, Human Dimensions, Hydrosphere and Cryosphere, Oceans, Solar System, Solid Earth. Complete sample exercises are also included for a Gallery Walk involving weather map analysis and soil morphology.

[learn more here](#)

### References on Gallery Walk

## 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.



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# Partnerships

Digital Libraries  
Institutional Partners  
Education Projects



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Provides a view into the sum of the collection from the partner projects:

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

The screenshot shows the website's layout. At the top is a navigation bar with the title 'Pedagogy in Action' and the tagline 'the SERC portal for Educators'. A search button is located in the top right corner. Below the navigation bar are three main content sections:

- The Library -- Connecting Theory to Classroom Practice**
  - [Teaching Methods](#): The What, Why and How.
  - [Activities](#): Direct from the Classroom
  - [Research on Learning](#): A Bibliography of the Print and Web literature
- The Pedagogic Service -- Create, Contribute, Customize**
  - Share Your Community's Expertise
  - Contribute an Individual Activity
  - Integrate the Library into your
    - Digital Library
    - Campus Learning Initiative
    - Education Project
  - Learn about our Existing Partners
- News**
  - Welcome to the newly launched Pedagogy in Action site. Our library provides a comprehensive view into the work of our partners in developing modules that explicate the how, what and why of a range of pedagogic techniques. Our partners are engaging their communities in documenting examples of these pedagogies in action: activities that educators are using in their classrooms today.
  - Another highlight is our growing catalog of print and web resources which spans the literature surrounding research on learning and its implications for effective teaching.
- Teach Geosciences? Check out the Teach the Earth Portal**
  - [Teach the Earth](#): The World's Best for Geoscience in Earth and Space Education
- Learn More About SERC**
  - [SERC](#): Science Education Resource Center

<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.

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## Evaluation of Impact

- Users
- Contributors
- Partners





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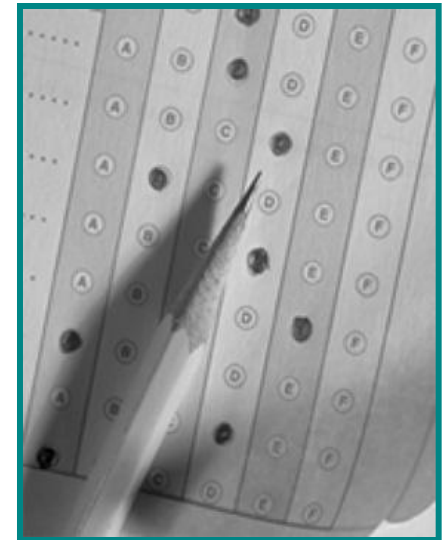
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## Evaluation Methods

- Surveys
  - Pop up survey of intense users
  - Survey of all contributors
- Case interviews
  - Partners
  - End users (identified through pop up survey)





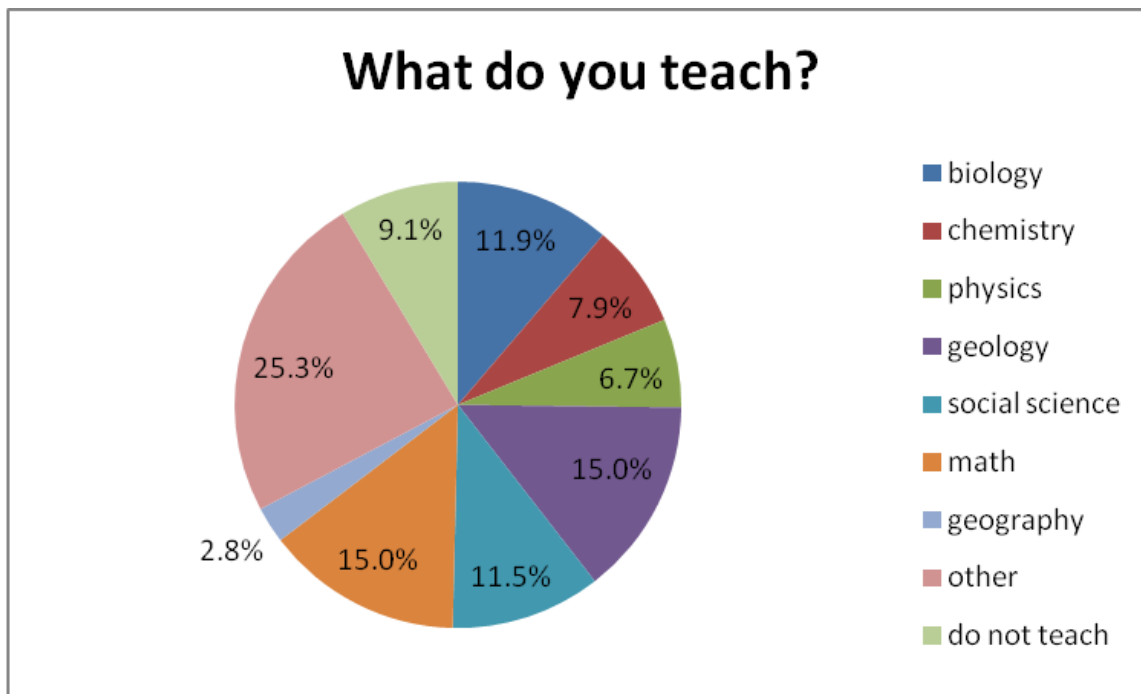
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## Interdisciplinary range of users



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## Impact of Resources

- Why do they come to the site?
- What do they find on the site of value?
- How does it impact teaching?



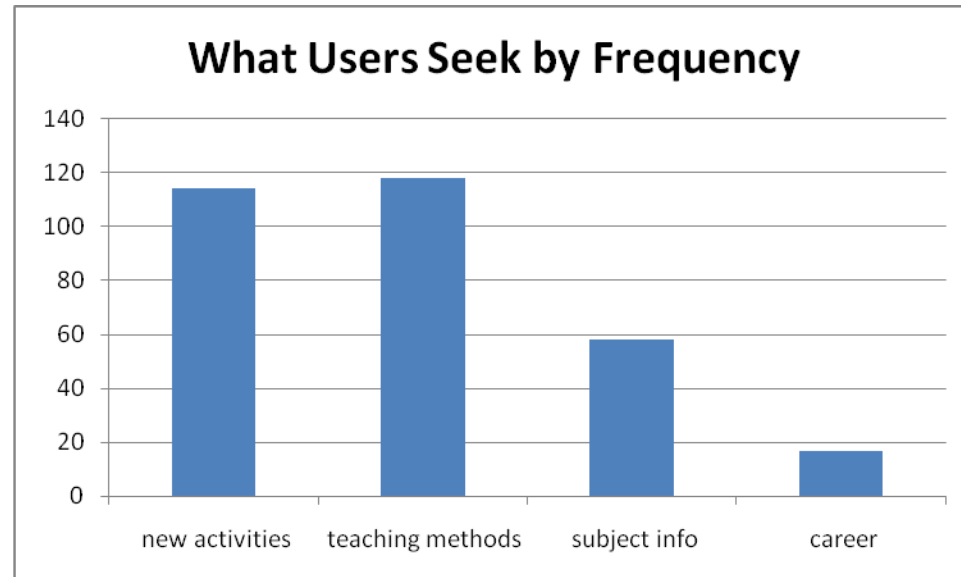
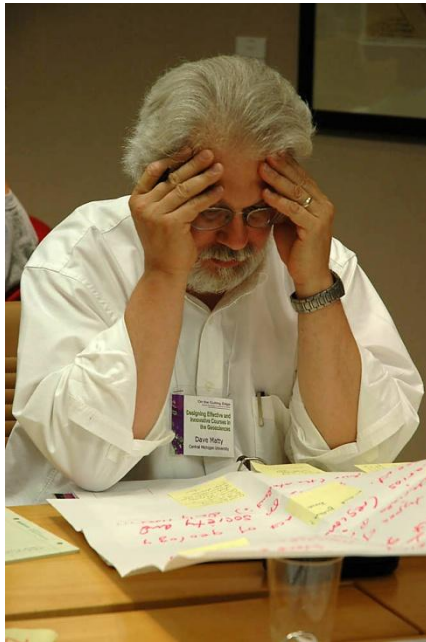
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## Why Do They Come to the Site?



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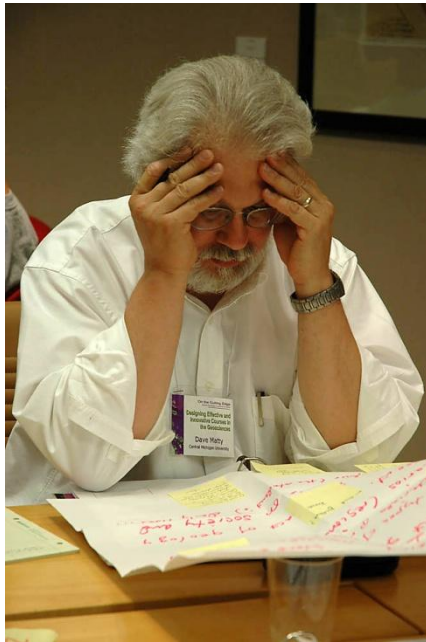
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## What Do They Find on the Site of Value?

- 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.”*



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## 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.

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## 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.*

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## 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 its goals to others, which has helped me think about other activities in my classes as well.”*

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## 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



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## 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.



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## 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.