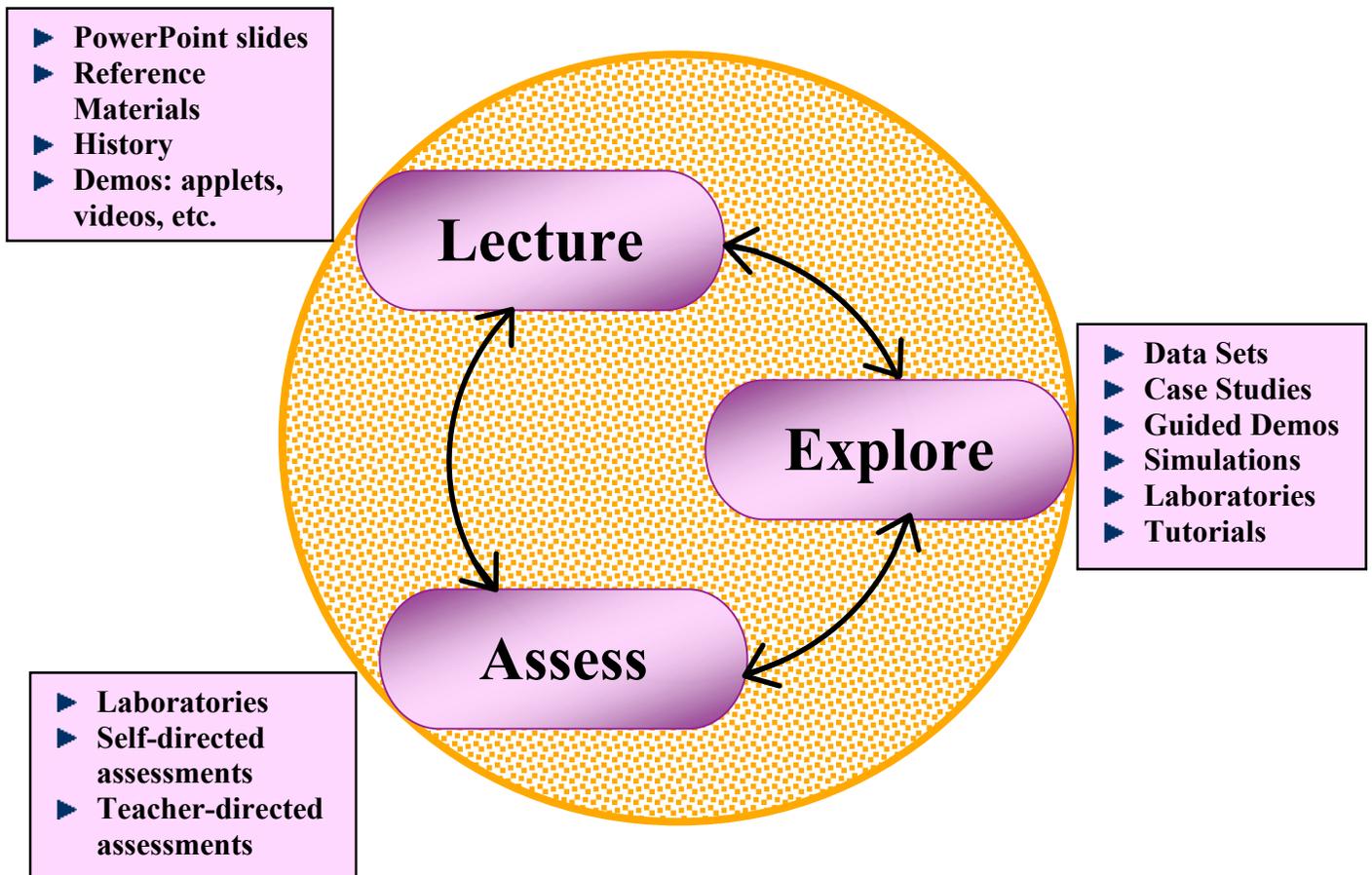


Utilizing a Digital Library to Teach Undergraduate Statistics US COTS Spotlight on Pedagogy, May 2005

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CAUSEweb, a new digital library for undergraduate statistics instructors, is a great source for on-line teaching and learning materials. This searchable database of resources includes lecture examples, laboratory activities, datasets, analysis tools, etc. CAUSEweb's resources can be easily integrated into instructional plans for statistics courses.



Searching Hints:

It often helps to search not only by topic, but also by ***type of resource***, ***application area***, or ***object format***. For instance, if you want an applet that simulates the Central Limit Theorem and applies to business, type **applet + simulation + business + central limit theorem** in the search box. (The “+” signs are optional.)

Resource Types: animation, case study, collection, drill and practice, quiz/test, lecture/presentation, reference materials, simulation, sound, tutorial, webpage.

Application Areas: biology, business, psychology, mathematics, etc.

Object Formats: Java applet, audio, video, Flash, etc.

Utilizing a Digital Library to Teach Undergraduate Statistics: An Example

Correlation and Regression	
L E C T U R E	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ffffcc; margin: 0;">Linear Regression</p> <ul style="list-style-type: none"> • Regression relationship = trend + residual scatter $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x + \text{Err}_r$ • Trend=best linear fit Line (LS) $\hat{\beta}_1 = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2}; \quad \hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$ • Scatter = residual (prediction) error $\text{Err} = \text{Obs} - \text{Pred}$ $\sum_{i=1}^n (y_i - \hat{y}_i)^2 = (y_1 - \hat{y}_1)^2 + (y_2 - \hat{y}_2)^2 + \dots + (y_n - \hat{y}_n)^2$ </div> <p>Slides like this one from the PowerPoint presentation Statistical Methods in Biomedical Imaging¹ can be used to save a lecturer the time of creating his or her own.</p> <p>Search Criterion: correlation + regression + lecture/presentation</p> <p>¹ Ivo Dinov. UCLA STAT 233. http://www.stat.ucla.edu/~dinov/courses_students.dir/04/Spring/Stat233.dir/STAT233_notes.dir/StatisticalMethods05.pdf</p>
E X P L O R E	<p>Applets like this one from SticiGui Java Tools² can be used to help students understand correlation and regression. Students can explore changes in the correlation coefficient and the data to see how it affects the regression line.</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; font-weight: bold;">Scatter, Correlation, and Regression</p> </div> <p>Search Criterion: correlation + regression + applet + simulation</p> <p>² Phillip Stark. UC, Berkley. http://stat-www.berkeley.edu/~stark/Java/Html/Correlation.htm</p>
A S S E S S	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; font-weight: bold;">SELF-ASSESSMENT</p> <p style="text-align: center; font-weight: bold;">Simple Linear Regression</p> <p style="font-size: 0.8em;">This exercise is designed to test your knowledge of Simple Linear Regression.</p> <p style="font-size: 0.8em;">You should not attempt this set of exercises until you have completed Workbook 6 of <i>Biometry: Statistics for Ecology and Natural Resource Management</i>.</p> <p style="font-size: 0.8em;">Note that recalling information in an integrative way is the key to deep learning. Avoid the temptation to look at the reminders until you have made a serious attempt at answering the questions.</p> <p style="font-weight: bold; font-size: 0.8em;">The Basics</p> <p style="font-size: 0.8em;">1) The Correlation Coefficient is a measure of</p> <ol style="list-style-type: none"> 1. <input type="radio"/> How well one variable can be predicted from another 2. <input type="radio"/> The causal relationship between two variables 3. <input type="radio"/> The degree to which two variables vary together 4. <input type="radio"/> A measure of the percentage variation in one variable that can be explained by the other 5. <input type="radio"/> A measure of linearity <p style="font-size: 0.8em;">2) Which of the following can simple linear regression NOT be used for</p> <ol style="list-style-type: none"> 1. <input type="radio"/> To establish a relationship that can be used to predict one variable from the other 2. <input type="radio"/> To establish causality between a predictor variable and a response variable </div> <p>Using self-tests like this one from Biometry: Statistics for Ecology³, students can submit their answers and get immediate feedback in terms of a grade as well as questions or topics which need improvement.</p> <p>Search Criterion: regression + quiz/test</p> <p>³ Arthur Georges. University of Canberra. http://aerg.canberra.edu.au/envirostats/bm/selftest.htm</p>