

# Lesson Study in Economics:

## Developing Students' Thought Processes For Choosing Appropriate Statistical Methods

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BACKGROUND	THE LESSON	THE STUDY
<p><b>Course: BUS 230 - Business and Economics Communication and Research</b></p> <p><b>About the Course:</b></p> <ul style="list-style-type: none"> <li>- Students conduct a statistical analysis appropriate for their own research project.</li> <li>- Students write a significant research paper.</li> <li>- MTH 145 (Elementary Stats) is a prerequisite</li> </ul> <p><b>Learning Goals:</b></p> <p>Help students develop a way to organize knowledge of statistical tests that is conducive to applying this knowledge to answer research questions.</p> <p><b>Challenge:</b></p> <ul style="list-style-type: none"> <li>- Students are competent in computation and implementation procedures for statistical tests.</li> <li>- Students have not yet <b>organized this knowledge</b> in a way that is effective to apply it.</li> </ul> <p><b>We want students to consider key questions:</b></p> <ol style="list-style-type: none"> <li>1) Number of variables?</li> <li>2) Scale of Measurement?</li> <li>3) Intent of test (Differences or Co-movement)?</li> <li>4) Independent or Paired Samples?</li> </ol>	<p><b>Background on the Statistics Unit:</b></p> <p>Students (re)introduced to a number of statistical tests, how to implement them, how to interpret result, and <b>how to identify appropriate statistical tests</b> to answer research questions.</p> <p><b>Our Knowledge Organization - Decision Tree:</b></p> <ul style="list-style-type: none"> <li>- Jointly developed a lesson on how to organize knowledge about statistical tests.</li> <li>- Based on the <i>four key questions</i> to the left.</li> </ul> <p><b>Four In-class Exercises:</b></p> <ul style="list-style-type: none"> <li>- Challenged students to: <ul style="list-style-type: none"> <li>(a) Pick statistical test for a research question</li> <li>(b) State reasons for the choice</li> </ul> </li> <li>- Focused on four statistical tests: <ul style="list-style-type: none"> <li>(A) One-sample T-test</li> <li>(B) Independent Samples T-test</li> <li>(C) Paired Samples T-test</li> <li>(D) Chi-Squared Test of Independence.</li> </ul> </li> </ul> <p><b>Fall 2011:</b> Two exercises - Decision Tree - Two exercises</p> <p><b>Spring 2012:</b> Decision tree thru unit - Four exercises</p> <p><b>Week Later Pop-Quiz:</b> Recreate Decision Tree from Memory</p>	<p><b>Classroom Observation:</b></p> <ul style="list-style-type: none"> <li>- Students' written work, observed students' discussions</li> <li>- Did students reflect on <i>four key questions</i>?</li> <li>- Did students get it right?</li> <li>- Did they have irrelevant considerations?</li> <li>- Did they have well-articulated reasons for their decisions?</li> </ul> <p><b>Findings in Fall 2011:</b></p> <ul style="list-style-type: none"> <li>- Improved performance after the decision tree intervention.</li> <li>- Decision trees drawn from memory reveal students did not yet completely understand decision-making process.</li> </ul> <p><b>Findings in Spring 2012:</b></p> <ul style="list-style-type: none"> <li>- Students' overall performance same or worse than those in Fall 2011 who had not been exposed to decision tree.</li> <li>- Excellent use of key questions</li> <li>- Excellent retention of the decision tree.</li> </ul> <p><b>Surprising Findings / Remaining Challenges:</b></p> <ul style="list-style-type: none"> <li>- Statistical and colloquial vocabulary caused significant confusion (eg: independence, relationship)</li> <li>- Confusion on what constitutes a variable and what is the scale of measurement.</li> </ul>

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