Improving Student Learning Outcomes Through the Use of Well-defined Learning Objectives

Betsy Knowles and Laurie Strangman
Department of Economics, UW-L

The Problem

•BUS 230 is an introductory research methods course in which students work in teams on a semester-long research project.

•The first step in the research process is to develop research questions and hypotheses.

•Students often developed research questions and hypotheses that were vague or confusing in terms of language, did not contain measurable concepts, and were too narrow in scope or vision. This often led to final research projects that failed to provide useful information to a business decision maker or to address the overall research problem.

•We initially began this research as a Lesson Study Project with the goal of developing a means that would guide students through this first step in the research process and ultimately improve student learning outcomes.

Prompts for Problem Definition Process

- What is the broad business problem or question?
- Who is the decision-maker? From whose point of view are you looking at this issue?
- Whose behavior is the decision-maker interested in?
- What do you need to know ***as the decision maker*** to address this broad business problem? What questions might you ask to attempt to answer this broad business problem?
- Have you considered all the stakeholders associated with the problem, or all the different groups that may impact the situation or be impacted? (Brainstorming)
- Can you connect related questions with arrows? Do those arrows mean:
  - "impacted by"
  - "depends on"
  - "affects"
  - "need to know"
- Could you collect data to answer this question? (If the answer is no, then the question is x'ed off the board)
- Could you use the data to answer the broad research problem or to make a decision? Does the decision-maker have control over this variable? (If the answer is yes, then the question is circled.)
- Have you asked all the important or relevant questions? Have all the important issues been identified?

The Process

•Began by better articulating the learning outcomes that we hoped to achieve

•Initially identified seven characteristics that research questions and hypotheses should exhibit in order to provide a solid foundation on which to build a research project

•These characteristics became the basis of a grading rubric used to assess student learning outcomes.

•Over the course of the next three semesters, we documented what was lacking in student work and used this to better articulate and define these characteristics.

•Two tools were developed to help students successfully navigate the process: a question map and a problem definition table.

•The question map visually portrays the brainstorming process that researchers use to identify the important pieces of information that are necessary to address a research problem. Nine prompts or questions were developed to move students through this process.

•The problem definition table helps students take the important elements from the question map and organize them into cohesive research questions and hypotheses.

•A lesson was developed to give students multiple opportunities to use these tools to practice writing research questions and hypotheses.

The Results

•To assess the effectiveness of this new approach we jointly evaluated 122 student research proposals drafted over five semesters; 51 of these were generated by student research teams before the implementation of the revised lesson, while 71 were developed after.

•Proposals were evaluated using the rubric that was based on the learning objectives that we developed. The mean scores before the implemented changes were compared to the mean scores following the changes in the lesson design.

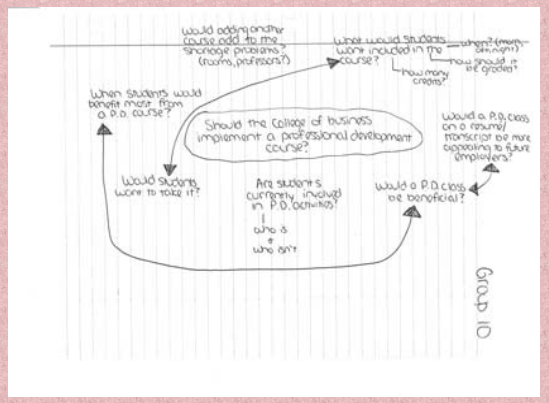
•We feel improvements in student learning occurred because we clearly articulated to students the characteristics that research questions and hypotheses must have to address the overall research problem. We also feel that improvements stem from the use of the tools that we developed and the opportunity that these tools provide for increased student engagement with the material.

Table Comparing Mean Scores before the Implemented Changes to the Mean Scores Following the Changes in the Lesson Design

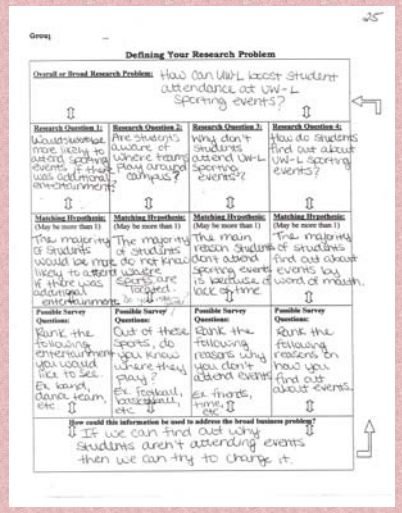
Learning Objective	Mean Score Prior	Mean Score After
Vision or Scope ***	2.73	3.29
Information is Useful	3.95	3.96
Research Questions are Well-defined **	3.35	3.89
Research Hypotheses are Well-defined	3.36	3.66
Research Hypotheses are Measureable/Testable	3.08	3.35
Research Questions and Hypotheses are Directly Related *	3.09	3.53
Aggregate Score over all Objectives**	3.26	3.61

*Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Question Map Example



Problem Definition Table Example



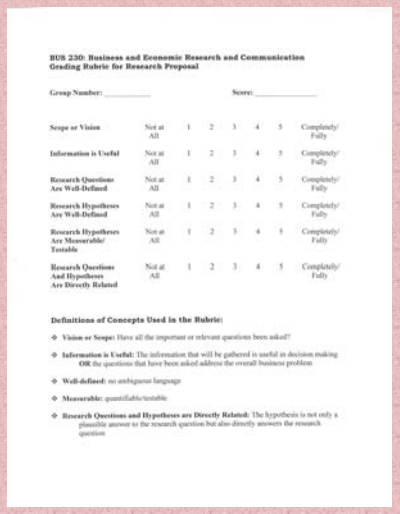
Defining Your Research Problem

Overall or Broad Research Problem: How can UW-L boost student attendance at UW-L sporting events?

Research Question 1:	Research Question 2:	Research Question 3:	Research Question 4:
Would/what more ways to attend sporting events if there was additional entertainment?	Are students aware of where teams play around campus?	Why don't students attend UW-L sporting events?	How do students find out about UW-L sporting events?
Matching Hypothesis: (May be more than 1)	**Matching Hypothesis:** (May be more than 1)	**Matching Hypothesis:** (May be more than 1)	**Matching Hypothesis:** (May be more than 1)
The majority of students would be more likely to attend if there was additional entertainment.	The majority of students do not know where sports are located.	The main reason students don't attend sporting events is because of lack of time	The majority of students find out about events by word of mouth.
Possible Survey Questions:	**Possible Survey Questions:**	**Possible Survey Questions:**	**Possible Survey Questions:**
Rank the following entertainment you would like to see. Ex. band, dance team, etc.	Out of these sports, do you know where they play? Ex. football, basketball, etc.	Rank the following reasons why you don't attend events. Ex. friends, family, etc.	Rank the following reasons on how you find out about events.

How could this information be used to address the broad business problem?
If we can find out why students aren't attending events then we can try to change it.

The Rubric



BUS 230: Business and Economic Research and Communication
Grading Rubric for Research Proposal

Group Number: _____ Score: _____

Scope or Vision	Not at All	1	2	3	4	5	Completely/ Fully
Information is Useful	Not at All	1	2	3	4	5	Completely/ Fully
Research Questions Are Well-Defined	Not at All	1	2	3	4	5	Completely/ Fully
Research Hypotheses Are Well-Defined	Not at All	1	2	3	4	5	Completely/ Fully
Research Hypotheses Are Measurable/ Testable	Not at All	1	2	3	4	5	Completely/ Fully
Research Questions And Hypotheses Are Directly Related	Not at All	1	2	3	4	5	Completely/ Fully

Definitions of Concepts Used in the Rubric:

- **Vision or Scope:** Have all the important or relevant questions been asked?
- **Information is Useful:** The information that will be gathered is useful in decision making **OR** the questions that have been asked address the overall business problem
- **Well-defined:** no ambiguous language
- **Measurable:** quantifiable/testable
- **Research Questions and Hypotheses are Directly Related:** The hypothesis is not only a plausible answer to the research question but also directly answers the research question

Funding for this research provided by a SoTL grant