

## **Step 5: Writing Well Developed Research Questions**

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### **Introduction**

Your review of the literature leads to a problem that needs to be investigated and a purpose for your study. Derived from your purpose and problem, a research question or questions are identified. The type of question or questions you posed guided your choice of research approach.

Now that an approach has been chosen, you need to work on better developing your research question so that it/they are researchable, this includes identifying and operationally defining your variables. They also need to reflect the type of research design that you choose.

### **Topical Discussion: Research Questions**

#### **Developing a Researchable Question.**

As a beginning researcher, you may find that formulating a well developed, researchable question is one of the most difficult tasks you will encounter in this process. There are several reasons that formulating a research question or questions may be challenging. One reason is the fact that there are so many questions to answer, it is hard to pick one or a few. Another is that there are not necessarily technical requirements for writing a research question, as there are for other aspects of the plan such as the design or statistical analysis. Although there are not technical requirements, researchers have posed guidelines to assist you in developing solid research questions.

LaFountian and Bartos (2002, p.42), suggest that a researchable research question has the following elements:

- Asks about the relationship between two or more variables, variables that are clearly defined
- Is stated clearly in the form of a question
- Is testable (i.e. possible to collect data to answer the question)
- Does not pose an ethical or moral problem for implementation,
- Is specific and restricted in scope (Your aim is not to solve the world's problems),
- Identifies exactly what is to be solved.

Additionally, a good research question clearly identifies the population you aim to study.

Let's look at an example question a beginning researcher may pose, and use these guidelines to make this question a researchable question.

A beginning researcher may ask:

What is the effectiveness of technology education on pre-service teachers?

What is the effectiveness of a parenting class for parents with difficult children?

What is the effectiveness of media rich technology education on students?

Let's examine the latter question. This question is stated in question form. The researcher did not state, "The media rich technology education will be effective for students." It does not appear to pose any foreseeable ethical or moral problems at this point, and the question does not pose any value judgments. The question does ask about the relationship between two variables, a media rich technology education and effectiveness. However, these variables are not clearly defined, thus, making it difficult to identify what exactly it is that the researcher is attempting to solve and making it difficult to determine if it is testable. The population is students, but this could also be more clearly defined.

What is meant by effectiveness, media rich technology education, and students? These terms need to be clearly defined, more specifically, operationally defined, to make this question researchable (LaFountian & Bartos, 2002). An operational definition is a clear, concise definition of how a variable is being measured or the observable condition (LaFountian & Bartos, 2002). This is distinctly different from a simple dictionary definition.

For example, in the dictionary, effectiveness is defined as "adequate to accomplish a purpose; producing the intended or expected result." This is not precise enough for research purposes as this could refer to numerous things. It only defines the general construct. A more exact indicator of effectiveness may be the score on a validated math achievement test and scores on a validated math attitude survey (e.g. Attitudes Toward Mathematics Inventory). The media rich technology education may more precisely be the Math 2.0 program, and students may more precisely be defined as a second grade students enrolled in a regular education classroom. The entire question, with operational definitions, may read:

- What is the effect of the Math 2.0 program on second grade students' mean math achievement scores?
- What is the effect of the Math 2.0 program on second grade students' attitude toward math as measured by the Attitudes Toward Mathematics Inventory ?
- Is there a difference in the mean math achievement scores of second grade students who participate in the Math 2.0 program as opposed to second grade students who participate in a traditional math class?
- Is the difference in the second grade students' attitudes toward math as measured by the Attitudes Toward Mathematics Inventory who participate in the Math 2.0 program as opposed to second grade students who participate in a traditional math class?

These questions are clearer and more focused. These questions specify the method of measurement and the specific population. The questions identify the specific participants to be studied, the variables included in the study, and the specific data that is to be collected. In fact in the second question, both levels of the independent variable are clearly identified. It is clear that the research intends to compare two groups who participated in two different treatments. The questions are testable.

## Writing a Question to Reflect Your Design and Analysis: Choosing the Terminology

Not only are operational definitions of variables important in identifying exactly what is to be solved; the terminology used to ask about the relationship between variables is also important. Although not all researchers would agree as they use terminology interchangeably, some researchers suggest that the terms used imply the research design and statistical analysis that will be used in the study. Thus, it is important for you to be precise in terminology.

- If you use the term “relationship,” you imply that you are looking for a simple relationship between variables. Thus, you probably intend to conduct a correlation study.
- If you use the term “difference,” you imply that you intend to compare two or more groups. Thus, you probably intend to conduct a group comparison study.
- If you use the term “effect,” you imply that you intend to determine if one variable caused an effect on another variable. Thus, you probably intend to conduct an experimental study.

Let’s consider some example questions, “Is there a difference in university students’ perceived learning based on type of online course in which they participate (synchronous and asynchronous or asynchronous only)?” This question implies that a causal comparative research design may be used. It also implies the use of an independent  $t$  test because two independent groups are being compared on one variable. The question, “Is there a difference in university students’ teaching presence, cognitive presence, and social presence based on type of online course in which they participate (synchronous and asynchronous or asynchronous only)?”, may also imply the use of a causal comparative research design. However, it implies the use of MANOVA because two independent groups are being compared on three related variables.

So, the terminology that you use in posing your question should precisely represent what you are examining; the research question(s) should inform both your research design and analysis choices. It is a good idea to reexamine the alignment of your question, hypothesis, research design, and analysis after you have written your entire plan. Toward the end of this workbook there is a chart to assist you with this.

## Choosing a Directional or Non-directional Research Question

In discussing the writing of researchable research questions, it is important to discuss one final aspect, directional versus non directional questions.

**Non- Directional Questions.** Non- directional questions do not specify the direction of the expected relationship nor specify that one group will do better than another. Words such as “effect,” “difference” and “relationship” denote non- direction.

- The question, “What is the effect of the Math 2.0 program on second grade students’ mean math achievement scores ?” is a non-directional research question.

**Directional Questions.** Directional questions specify the direction of the expected relationship or specify that one group will do better than another. Words such as “increase”, “decrease”, “positive relationship,” and “negative relationship” denote direction.

The question, “Does second grade students’ participation in the Math 2.0 program increase their math achievement scores?” is a directional question.

Directional questions should only be posed when the literature clearly supports their use. For, if a wrong direction is predicted, significant findings can be missed. That is, if a directional question is posed, the hypothesis should be written consistently as a directional hypothesis and a one tailed analysis should be conducted.

### **The Case of Charlie**

Charlie proposed the following research questions based on his identified design and variables:

- Is there a difference in the anxiety levels (as measured by the Beck Anxiety Inventory® (BAI®); Beck & Steer, 1990 ) of college freshman diagnosed with generalized anxiety disorder when participating in a traditional freshman orientation as compared with the EI CBT freshman orientation while controlling for anxiety scores?
- What is the effect of participation in a traditional freshman orientation as compared with the EI CBT freshman orientation on college freshman’s academic achievement as measured by first semester GPA while controlling for previous achievement (i.e. High school GPA)?
- What is the effect of participation in a traditional freshman orientation as compared with the EI CBT freshman orientation on college freshman’s interpersonal skills as measured by the Positive Relations With Others scale (Ryff,1989; Ryff & Keyes, 1995) while controlling for previous interpersonal skills?

### **Application: Developing My Research Plan**

Now it is your turn. What is your research question or questions?

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Now let’s analyze each question using LaFountian and Bartos (2002, p.42), guidelines:

- Are you posing a question stated clearly in the form of a question? Yes/ No
- Does your question ask about the relationship between two or more variables? Yes/ No
- Are the variables clearly defined? More specifically, operationally defined? Identify each variable and write the operational definition.

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- Is your question testable, that is, is it possible to collect data to answer the question? Yes/ No
- Do you think that your question will pose any ethical or moral problems for implementation? For example, are you an administrator asking those under your authority, perhaps teachers, to participate in your non-anonymous research? If so, you may ask is this truly then voluntary participation in my research or might the teachers feel coerced? Probably the later; thus, your question probably poses an ethical problem for implementation. Likewise, if you are a counselor and are asking clients to participate in your research, because of the power differential they may feel coerced if your research is borderline, how will you safeguard against coercion?

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- Is my question specific and restricted in scope? Have I limited the number of questions I am asking? Yes/ No
- Is my population clearly identified in my question? Y/N

After analyzing my research question or questions, what are my revisions? Rewrite each research question.

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After reviewing the research question (s), I just wrote, is the terminology (e.g. “relationship,” “effect) appropriate for what I plan to study? Rewrite the questions (s), if needed, to reflect a group comparison, correlational, or experimental study.

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Based on the terminology used, is my question(s) directional or non-directional? Directional/  
Non-directional

Does the literature support my directional or non-directional question(s)? Explain and provide citations to support assertions.

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Do I want to keep my question(s) as they are or change it/ them to be directional or non directional? Here are the research question(s) I plan to use for my research plan.

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