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Demystifying Operational Definition and Levels of Measurement

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Great Ideas For Teaching Students (G.I.F.T.S)

Abstract

Teaching mass communication research methods at the undergraduate level attains an increased challenge because students at this stage seem to be more focused on skill-based courses in order to work in various media-related professions. Most of them have difficulty in comprehending that learning research methods is beneficial to them as it helps build their analytical and logical thinking. Among various aspects of research methods such as trying to figure out the link between theory and method, a constant struggle for beginners is to understand what is an operational definition and the levels of measurement. The key lies in demystifying research concepts and terms with what these students can relate to so they can develop an appreciation for analytical and logical thinking in their professional and scholarly endeavors.

Key words: levels of measurement, operational definition

Introduction

The purpose of this paper is to help students learn the difference between conceptual and operational definitions, and the levels of measurement in the mass media research methods course. Among various aspects of research methods, such as trying to figure out the link between theory and method, a constant struggle for beginners is to understand what is an operational definition and the levels of measurement.

Teaching undergraduate level research methods presents an increased challenge because students at this stage seem to be more focused on skill-based courses in order to work in various media-related professions. Most of them face difficulty in comprehending that learning research methods is beneficial to them as it helps build their analytical and logical thinking. Yes, there are a few of them who get the hang of this course as they are likely making plans to attend graduate school.

The immediate challenge to an instructor teaching this course is to make it interesting and motivating for the students in meaningful ways. The standard approach to teach this course, the way it is typically done at the graduate level, by keeping it abstract and to the textbook would not work with undergraduate students. The key lies in demystifying the research concepts and terms with what these students can relate to so they can develop an appreciation for analytical and logical thinking in their professional and scholarly endeavors.

The pedagogical concepts explored in this paper are helpful in teaching quantitative research methods courses in mass communications and related disciplines.

Rationale

In the process of making students understand the difference between conceptual and operational definitions, the first step is to make them differentiate between an idea and its implementation. In this scenario, it is important for an instructor to understand that keeping students tied to textbook definitions and examples might not help much or at the most may lead to only memorizing the text without really understanding the meaning.

Directions

Explaining it to students that the conceptual definition is basically an idea. In simple terms, it is the literal meaning. For instance, if research is being conducted to examine *violence* in videogames then what is the definition of violence? Students have an idea of describing violence in their own words as an act of hurting people or destroying objects. They get this. But, the challenge is making them understand how to operationalize this literal or conceptual definition.

Now, for the operational definition if they are simply asked to describe what the observable indicators are and how the indicators can be observed, then it is quite likely for them to get caught up in research jargon, thereby causing confusion. Instead, it will be more helpful to ask them, how would they know what they are watching in the video game is violence? Then they are prompted to respond with observations such as "watching the characters attacking each other with weapons and destroying objects around them."

At this moment, it helps to pause and let them understand that these observable violent actions could be measured and that is what is called an operational definition or defining by action. Then elaborating to them that this process in an operational definition is what facilitates measuring of a concept or an idea and that this process is called *operationalization*. For instance, now

the violent actions of various characters such as shooting at each other with weapons or throwing objects at one another in the video game can be measured in terms of the frequency and intensity with which they occurred.

When concepts are operationally defined, they take the shape of variables, which can be measured. So, by measuring the degree of violence in video games these can be categorized and determined fit to be played by children or adults. This can be followed by making them read some related peer-reviewed journal articles where violence in video games has been conceptually and operationally defined (e.g., Smith, Lachlan, & Tamborini, 2003).

Explanation

The next step in the process is explaining what are variables and how they are measured. While explaining different categories of variables – dichotomous, discrete or continuous – and how they are used – independent or dependent variable – is a challenge in itself; going over the levels of measurement usually leaves the students perplexed as they confuse it with mathematics rather than understanding underlying logic.

One way to help the students understand and retain the knowledge of levels of measurement –nominal, ordinal, interval, and ratio – is through the *mnemonic* technique by tying them to the basic math; addition, subtraction, multiplication and division. The mnemonic here is used only as an aid to remember the pattern and represent increasing complexity from the nominal to the ratio level only, and not for any mathematical value. See the table below:

Levels of measurement with mnemonics

Levels of Measurement	Mnemonics
<p>Nominal: Assigns a numeral to a variable, without quantifying the numeral. <i>Example:</i> Biological sex Male = 1 Female = 2</p> <p>Here, numbers are only for labelling purposes and have no quantitative meaning, i.e., 2 here does not mean it is more than 1.</p>	<p>Addition</p>
<p>Ordinal: The numerals are rank ordered from low to high, or high to low. <i>Example:</i> Letter grade A, B, C, D, F</p>	<p>Subtraction</p>
<p>Interval: All attributes of ordinal with equal spacing between the ranks and not a true zero. <i>Example:</i> Scale on a thermometer Likert scale ranging from strongly agree to strongly disagree</p>	<p>Multiplication</p>
<p>Ratio: All attributes of interval with a true zero. <i>Example:</i> Time, distance, velocity, Age</p>	<p>Division</p>

In the above table the right column details the four levels of measurement with examples. The right column gives the math mnemonics to help students memorize the levels of measurement by minimizing confusion. This is only meant for the initial stages where the students are learning for the first time about the levels of measurement.

Also, here is an example to demonstrate the same variable of *age* being measured at different levels:

Nominal (Are you older than 30?) ___ Yes ___ No

Ordinal (How old are you?) teenager, young adult, middle age, elderly

Interval (How old are you?) ___ 21-30 ___ 31-40 ___ 41-50

Ratio (How old are you?) ____ years

Results

An exercise is given to students as a take home assignment after going over the topic with examples in the class lecture. After this take-home assignment is graded, it helps to debrief the assignment to the students and answer their follow up questions. Students react in a positive way to demystifying various technical jargon, the steps involved in operationalization, and the levels of measurement. Students appreciate the fact that they are not merely forced to memorize the definitions without really understanding them. They find this learning approach helpful in boosting their confidence in understanding and conducting research. The main takeaway for students is that research is logical, cumulative (literature-review driven), guided by theories/models, and that research is done to add new knowledge.

References

- Smith, S., Lachlan, K, & Tamborini, R. (2003). Popular video games: quantifying the presentation of violence and its context. *Journal of Broadcasting & Electronic Media, 47*(1), 58-76.
- Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences* (4th ed.). Pearson Prentice Hall.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12*, 353-359.