

Variables' Measurability in Social Sciences Research

A Major Challenge for EFL Novice Researchers at Mohamed

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Abstract in Arabic	في هذه المقالة يقوم الباحث بتوضيح واحدة من بين اهم الصعوبات التي يواجهها طلبة الماستر في تخصص اللغة الإنجليزية كباحثين جدد وهي مشكلة المتغيرات التي هي موضوع البحث والتي تكون مركبات او مفاهيم تحمل ابعادا متعددة. حيث ان طبيعة العلوم الإنسانية الغير دقيقة يجعل البحث التجريبي فيها يفتقد لعناصر الحتمية والدقة التي تميز العلوم الطبيعية التي تدرس فيها متغيرات واضحة قابلة للقياس ولا تحتل التاويل او المقاربة. والسبب في ذلك يعود الى كون البحث في العلوم الانسانية يسلط الضوء على سلوك الانسان او ميوله او علاقاته الاجتماعية او طريقة تفكيره التي في معظم الأحيان لا تخضع للثبات وتعتبر مجردة. ويؤثر هذا على اختيار الإشكالية وبناء الفرضيات كما يؤثر على النتائج وتحليلها. يتوجب على الباحثين تحويل المتغيرات الى دلالات قابلة للحساب حتى يتمكن من بمنهجية.	

	في هذا المقال إشارة الى طبيعة المفاهيم في ابحاث العلوم الإنسانية وطرق تحويلها الى متغيرات حسب شروط البحث العلمي.	
Abstract :	The present paper sheds light on one of the main challenges that EFL master 2 students face when undertaking academic research at Mohamed Kheider university. A challenge that is basically due to the nature of variables under investigation. Because social sciences research is concerned by understanding and analysing human behaviour, needs, thinking, social interactions and many aspects of human culture, the variables treated in research present progressive levels of abstraction which makes their measurement a difficult task for the novice researchers. This difficulty is reflected in the research problem elaboration, hypotheses building and even in the results' analysis. The present paper gives an explanation of variables' nature in social sciences research and scales to measure them.	
Keywords :	social sciences; academic research; foreign languages; variables' operationalization.	

Introduction:

In explaining Scientific knowledge, Bhattacharjee (2012 : 2) states that the purpose of science is to create scientific knowledge and scientific knowledge refers to a generalized body of laws and theories to explain a phenomenon or a behaviour of interest that are acquired using the scientific method. His statement fairly denotes that the method we implement in research can lead to a scientific knowledge only if the method is scientific. It is noteworthy here to say that research methodology norms and principles were basically designed and developed for natural sciences, where phenomena and elements under research have a common criterion which is measurability. It was until the 19th century that these principles found application in social sciences. Among the various differences between social sciences and natural sciences is the process of research and its criteria. Though scientific research steps and principles are equally applied in both disciplines, the nature of each of them dictates the process application even if the norms are the same.

Reliability of results, confirmability, repetition and measurability are the criteria of natural sciences research but not definitely those of social sciences research. In the foreign language studies, for instance, researchers have to observe the fact that their investigations will relate abstract concepts and multi-dimensional constructs which very often makes their measurement far from being an easy and clear task for novice researchers

1. Variables in Social Sciences Research

The importance of variables in research lies basically in the fact that they constitute the elements of manipulation, measurement and control, to understand relationships, causes, and effects. They enable the framing of research questions, the formulation of hypotheses, and the interpretation of results.

Unlike natural sciences researchers, social sciences researchers face a real difficulty in treating variables in their academic research, since variables in natural sciences have fixed and clear definitions while in social sciences' research, the research problem relates concepts and constructs that might carry more than one meaning and hence many definitions.

The challenge faced lies in the possibility to limit the research process to a particular aspect or dimension of these concepts or constructs and direct the research process to it exclusively.

Thus, researchers have to limit their research to one definition of the concept and state it clearly, then attempt to turn it into a variable with values or attributes, in other words, the combination of indicators at the empirical level representing a given construct is called a variable if we consider McBurney (2007) definition of the variable. It is considered as an aspect of a testing condition that can change or take on different characteristics with different conditions, we can clearly understand that the researcher has to carefully give measurable indicators to his tested concept as an essential norm of scientific research and without being measurable, the research can not be qualified as scientific.

2.2 Concepts and Constructs

Both concepts and constructs have progressive levels of abstraction which explains their various definitions.

Bhattacharjee, (2012) states that variables might be concepts as they might be constructs, the concepts such as weight are precise and objective while others like personality are abstract.

Kaur and Mittal (2021 :64) define the concept as :

« an idea expressed in words. It expresses an abstraction formed by generalization from particulars. A concept expresses an abstract idea, mental image or perception. » and concepts in general can be qualified by a higher degree of abstraction which makes them more difficult to contain in a simple and clear definition. In the field of foreign language studies, concepts like motivation, eagerness and discipline are frequently treated.

On the other hand, a **construct** is an abstract concept that is specifically chosen to explain a given phenomenon. It might be a simple concept or a set of concepts. If we take the example of “a liberal movement”, it contains the concepts of freedom, intellectual organization and social organization, ie a construct may be uni-dimensional like a simple concept as it can be multidimensional such as a person’s *communication skill*, which may consist of several underlying concepts such as the person’s *vocabulary*, *syntax*, and *spelling*.

Examples of types of constructs :

Ideas : Ageism, racism, self esteem, social capital, trust, morality, tolerance.

People : Age, gender, ethnicity.

Organizations : Financial performance, firm survival, corporate social responsibility.

Both concepts and constructs have progressive levels of abstraction which explains the existence of various definitions of constructs and concepts.

3. Difference between concept, construct and variable

Measurability is the main difference between a concept and a variable . Concepts are mental images or perceptions and therefore their meanings vary markedly from individual to individual, whereas variables are measureable. Concepts are subjective impressions; their understanding may differ from

person to person. It is therefore important for the concepts to be converted into variables as they can be subjected to measurement (Kumar, 2015).

The definitions above lead us to consider the nature of the variable being numerical because it takes different values since it is designed for natural sciences research basically while concepts investigated in social science have to be turned into variables to be measured which is difficult to achieve most of the time because of the fuzzy nature of these concepts such as motivation attitudes, comprehension and many others. Researchers have to find out indicators that can be measured but even if they do so, they might face the challenge of agreement on whether or not these indicators reflect the tested concept due to the nature of social sciences being related to human beings. For example, a researchers might assume that being disciplined and attendance to the lectures are an indication of a learner's motivation to learn but other researchers might disagree since some learners may be forced by their parents to attend sessions even if they have no interest at all in the lesson content. Such situations point at a certain degree of subjectivity as far as the indicator reflects the concept. When compared with natural sciences, variables' exactitude preserves the researcher from such confusion.

4. The Need for Conceptualization

The first difficulty that foreign language researchers face in research problem selection is specification and conceptualization, starting from an abstract idea or problem they face in learning, students relate complex concepts. The conceptualization process is important because of the imprecision, vagueness, and ambiguity of many social science constructs. Let's take the example of the speaking skill, listening skill, reading skill or writing skill, these are repeatedly investigated. In the research problem, novice researchers present the concept without specifying which element of the skill will be investigated which leaves the reader in front of a a fuzzy view of the concept. Such abstract and multi-dimensional concepts need to be dispatched to smaller units and the units have to be quantified in order to carry values and be qualified as variables.

As is the case for the speaking skill : pronunciation, fluency, grammar, vocabulary, and comprehension are the common known elements of the skill and without a clear specification from the part of researchers, readers can not understand which of these is the targeted aspect in the speaking skill. On the other hand, there are concepts like learners' motivation or achievement that also carry various aspects and controversial definitions because they belong to many disciplines. For example, motivation can be simply defined as a driving force behind human actions as it can be defined as an inferred process within a person, which cause this organism to move toward a goal or away from an

unpleasant situation. But the fact that the literature is replete with different definitions, it becomes difficult to clearly identify the elements that motivation might encompass. Elements that are supposed to be targeted in academic investigations and can be quantified to be called variables.

5. Concepts in the Data Gathering Tools

In gathering data, the novice researchers keep using the concept as a block in the questionnaires and interviews to respondents who have, in the absence of concept operationalization, an unclear conception of the variable under study. If a respondent is asked the question :

Which of the following skills presents a difficulty to you ?

1. The speaking skill
2. The writing skill
3. The reading skill
4. The listening skill

The answers gathered from this question will be of no scientific value since the skills are different and researcher did not target a specific element in the skills. The respondent was asked to select approximately an overall area of difficulty. This type of gathered information can not lead to substantial result or information for the analysis.

6. Concepts' Operationalization

From an empirical standpoint, constructs/concepts need to be translated from the abstract to the concrete, Pichler and Reiter (2022) state that the term operationalization was first discussed in 1927 in relation to physics. Operationalization is often defined as the process by which we spell exactly how a concept/ construct will be measured, Bhandari, (2022) states that operationalization means turning abstract concepts into measurable observations. The need for concepts' operationalization is dictated by the scientific research principle that relates quantified variables to obtain substantial results.

“Operationalization refers to the process of developing indicators or items for measuring these constructs. For instance, if an unobservable theoretical construct such as socioeconomic status is defined as the level of family income, it can be operationalized using an indicator that asks respondents the question: what is your annual family income? Given the high level of subjectivity and imprecision inherent in social science constructs, we tend to measure most of those constructs (except a few demographic constructs such as age, gender, education, and income) using multiple indicators. This process allows us to examine the closeness amongst these indicators”

Bhattacharjee (2012)

The main role of constructs' operationalization is to enable researchers to systematically collect data on processes and phenomena that are not directly observable, it also enables researchers to refine their hypotheses and develop an understanding of the relationships between variables

7. Scaling: Indicators' Creation

Scaling is defined by Bhattacharjee as “ a branch of measurement that involves the construction of measures by associating qualitative judgments about unobservable constructs with quantitative, measurable metric units”

The scale can be uni-dimensional if the construct is uni-dimensional like age or gender where the scale deals with one dimension (high or low) and it can be multidimensional when the construct is multidimensional like aptitude which can be measured with various types of tests for example. Three different scaling models are used in social sciences research:

Thurstone's equal-appearing scaling, (2) Likert's summative scaling, and (3) Guttman's cumulative scaling.

7.1 Thurstone Equal Appearing Scale

Thurstone's Equal-Appearing Interval Scale is a type of Likert scale that assigns values to a set of statements based on their perceived intensity or agreement. Unlike other Likert scales, however, Thurstone's scale uses accurate and precise statements to allow for more measurable attitudes. It works by presenting a group of statements to present different levels of the opinions being measured, and each statement is given a score based on its place on the scale. Then, the general score for every respondent will represent their overall attitude towards the item or issue being measured.

As an example, on a research project where the researcher investigates the local citizens towards employing immigrants, the following questions can be used:

1. The government decision to employ immigrants is wrong
2. Employing immigrants deprives the local citizens from these jobs
3. Employing immigrants brings new talents to the city job market
4. Employing immigrants is vital for collaboration
5. Employing immigrants can increase productivity
6. Employing immigrants opens space for talents' exchange

7.2 Likert Summative Scaling

A Likert scale is a survey-based research technique is implemented to obtain rating for items related to a single issue. Each item can be analysed in separation or under the items' group.

As an example, if we opt to investigate the degree of self confidence in work, we can choose statements like:

1. I can say that people at work are glad to have me there
2. I am glad with my relation with the other workers
3. I feel confident in handling any issue at work without others' help
4. I feel needed at work and my contribution is valuable
5. I am proud of my abilities at work

The scales uses would be: Strongly disagree, do not agree, agree and strongly disagree.

7.3 Guttman's Cumulative Scaling

Guttman scale is designed with elements that can be organized in a hierarchical manner. It is used to probe the attitudes of respondents as being negative or positive.

The objective of this scale is to categorize those participants who agree with 100% of the mentioned propositions in the scale. But, in practice, it is rarely possible that respondents perfectly agree with them, thus, scalogram analysis is made to evaluate the closest set of statements that the target audience agrees with.

Example: On an issue about the attitudes of the inhabitants of a given city on right to carry guns, we can have the following statements in the following order:

1. I am not in favour of any law that permits civilians to own guns
2. I am in favour of strong restrictions on gun sales
3. I am in favour of gun sale prohibition as far as civilians are concerned
4. I am in favour of checking mental health of gun users before sale

Conclusion

The complex nature of social sciences research dictates a careful dealing with its variables that are for the majority qualitative and closely related to human beings features, among which is abstraction change. One of the main challenges for novice researchers is translating constructs and concepts from their abstract nature to concrete and measurable items that fit the empirical research norms. This mission is far from being clear or easy; it implies the use of specific statements that help the researcher to obtain the construct/concept observable aspects and scale them. The elaboration of the proper statements and their order give more comprehension and concretization of the variable but agreement on these statements remains debateable.

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