Article Review on Descriptive Analysis in Education

Executive Summary

The main themes of this paper are to provide readers with rigorous insights on how descriptive analysis can be understood and applied in education. Yet, we are continuously looking for answers to questions of who, what, when, where, and to what extent on the topics of interests with a final purpose of improving educational quality. In order to address each research question, trends in data are often extracted to observe the most general patterns, variation was also separated out to segment the group of interest, or new measures were created when indicators sometimes can not alone explain the phenomenon. This is when descriptive analysis comes into play, it is not just there to support causal analysis in explaining the "why" question but it can stand on its own product to reveal a phenomenon that has not observed before. The theme that I like most in the article is the final one when the author argued that no matter how important the topic is, how good the method presents, and how the significance of the finding is drawn, the entire work can be on the shelf can not read an understand the conclusion or the key takeaway of the author's intention.

In Chapter 1, the authors began with a question of why we should care about descriptive analysis. From my point of view, is it a research question? or is it just a mere question? If it is a research question, how can the answer be quantified? What is the real problem with the state-of-the-art analysis? By diving into the content, I see the statement that there is a need to identify the causal relationships in education with the purpose of classifying, ranking interventions that work best for a particular setting. Current qualitative analysis can help to extract these causal relationships but it can not help to explain the underlying patterns in the data. Yes, I agree with this argument because the conclusion is drawn from the result, or in another word it can be attributed to data,

even the generated random data can also provide some patterns. So I think data alone can not be a good resource to depend on, we have to understand how to data is collected, preprocessed, and the assumption made in data gathering. This is not an easy part due to the fact that random noise exists. To alleviate this issue, a meta-data analysis for the data is needed as a means to help educators, practitioners, and administrators to carefully apply the intervention methods in their settings. In this regard, the meta-data analysis or descriptive analysis must be used in conjunction with causal relationship analysis to fully understand the study. In a nutshell, description plays a vital role in explaining the "why" question which can not be answered by merely using the existing quantitative analysis method.

In Chapter 2, the authors provided six steps in conducting a descriptive analysis. Starting from identifying a phenomenon that is independent of data and methods used, scientists can consider the features of interest or the most salient features. By having the important features in hands, analysts can justify which data collection method and procedure will be most applicable to the study. In the third step, the most representative salient features were identified as constructs or measures with the goal of transforming reality into data that are ready for analysis. I think this step is really an art and challenging as it requires a lot of domain knowledge, too many features will make the results overfitting in a given context whereas too few indicators will make the result too general. When we have data ready in our hands, step 4 involves extracting patterns in the data, one interesting characteristic of descriptive work in this process is that it does not rely on the pre-existing hypothesis. Once the interesting patterns are uncovered, in step 5, their meanings are conveyed to the intended readers through means of communication. The last step asked researchers to rethink and repeat the previous step as needed. This step makes sure that new ideas, research questions will come out or harness the current study.

In Chapter 3, the authors provided detailed descriptions of how to conduct a descriptive analysis, stemming from the careful chosen each word in the research question to explain constructs, measures, samples, and methods of synthesis analysis. The primary theme in this chapter is to minimize the assumption of the statistical method on the data. Fishing is a new term to express an idea that researchers try to make a conclusion from the quantitative analysis without looking

at their merit initially. As said before, data can be generated randomly and it can contain patterns. If the researchers do not carefully examine the data before analyzing it, the result is not reliable, some patterns can be detected but that patterns can not be used to represent the population. The most interesting concept to me is to "explain the data through reality" not "explain the reality through data". This understanding is important, the former refers to a process that we observe a phenomenon, in reality, exact salient features and save these features in data whereas the latter one does the opposite work.

In Chapter 4, the authors suggested that a communication method should be carefully chosen depending on the target audience. If the intended audience is a scientist then jargon can be used with care because researchers often share common knowledge on the terminology used. However, practitioners usually do not fully understand these terms, making it difficult for them to read and understand the study. I agree with the authors that, without letting readers understand our findings, the entire work could be meaningless and a waste of time. Table and data visualization are the two most commons mediums to convey meaning, and choosing which one to present result is challenging. Yet, the table is simple and straightforward as it represents actual data with little misunderstanding but it may be intriguing for a long and large amount of data. As such, readers may find themselves overwhelmed by looking at the numbers. In this regard, data visualization comes into play. However, the main drawback of data visualization is that it is too subjective because it mainly uses color, shape, and size to encode the data. Too much color will be messy or even not applicable for color-blind people. Too few colors may not be enough to encode multidimensional data. So many different approaches have to be tried and tested with some audiences.

The article is concluded in Chapter 5, the key takeaway in this paper is to understand the process of a study, from observing a phenomenon, identifying patterns, constructing measures, conducting analysis, to presenting the information. All of these steps involve descriptive analysis. A good research paper should not only applause the moment of "it works" but should be able to reveal the question of "why does it work".