Statistics is Essential for all Fields of Scientific Researches

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Abstract—In this world research is very important and essential in each and every field of theoretical and applied fields. The word research is too broad in meaning for different subjects and languages. Our research finds the significance of the term research and uses of statistics with research. All researchers depend on statistics in different scientific researches. We thoroughly explain the word research that “Re” mean again and “search” mean to seek something new. Statistics is the sole of research and sharpest tool of science, so sharp and effective in fact that we are often induced to statistics is an aid to science.

Index Terms—Research, Statistics, Sample, Data, Research Process

1 Introduction

Research is one of the ways of finding answers to your professional and practical questions. However, it is characterized by the use of tested procedures and methods and an unbiased and objective attitude in the process of exploration. Research is investigation and writing based upon the idea of scientific inquiry. A researcher may at this point wonder if this definition explains sheds any light on the significance subject.

Statistical tools are designed to detect and measure relationships and effects in situations where results cannot be identically replicated because of natural variability in the measurements of interest. They are generally used as an intermediate step between causal evidence and the determination of causal explanations. Many phenomena, such as remote viewing or the possible effect of prayer on healing, are amenabl to rigorous study. A statistical technique plays an important major role in making and drawing best appropriate decisions from those scientific studies. The role of statistics can play in summarizing and drawing conclusions from individual and collective studies.

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Teaching statistics is always a huge challenge for academics as well as learners because it involves many mathematical concepts. It has been observed that students are more engaged with applied statistics subjects when relevant practical and contemporary examples are used in class activities. Many researchers consistently have shown that involving students in learning experiences where they are actively participating as opposed to passively observing are the most effective ways to engage learners in the learning process. Many studies reveal that one of the important principles of good teaching to enhance students learning is to establish the relevance of what is being taught to everyday life, by drawing on real-life cases and current issues. The notion of relevance refers to the fact that at some point in the course students will be able to relate to the problems presented to them, and see them as their own problems. Relevance is a term used to describe how related, connected, or applicable something is to a given topic. It is assumed that incorporation of real-life examples into the curriculum, and relating these examples to the theoretical concepts being taught, will enhance the learning experience and engagement with the theories and practical activities.

Main Types of Research

There are two main types of researches:

Theoretical Research

Theoretical research is concerned with the development of appropriate methods for measuring new relationship specified by using statistical models. Since the data or observations of real life and not derived from controlled experiments, so theoretical research methods have been developed for such non experimental data.

Applied Research

In applied research we use the tools of theoretical research to study some special field of research and statistics, such as the production function, investment function, demand and supply function, etc.

Applied research methods will be used for estimation of important quantities, analysis of economic outcomes, markets or individual behavior, testing theories, and for forecasting. The last of these is an art and science in itself, and the subject of a vast library of sources.

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Objectives of the Study

- To simplify the meaning of research in broader sense with statistics.
- To analyse the statistics always involves in scientific research.

2 Literature Review

Jordan & Stroup (1984) suggested that although taking a statistics course may have resulted in a reduction in student fear of the course, it did little to persuade students of its value in the real world.

Swanson, Meinert, & Swanson (1994) found that compared with other core courses in a business curriculum, students perceive statistics to have little practical value, to be very difficult, and to have only average instructional effectiveness.

Schacht & Aspelmeier (2005) simplied the students often experience anxiety, a sense of intimidation, and lack of motivation when faced with statistics, such courses can be among the most challenging to teach often resulting in similar emotional reactions for instructors. Traditional statistics education has focused on the knowledge and skills components of learning or on the logical and physical aspects of understanding statistics, assuming that the desire to learn statistics or the mitigation of the emotional aspects will follow the acquisition of these skills.

Gephart (2006) explained the scientific statistical practice involves suitable scientific research procedures and artful decision making, not the rote application of accepted formulas as is sometimes assumed. Drawing upon a foundation in ethnostatistics and social learning theories this research presents a qualitative case study.

Merriam (2009) analysed the statistical practice in a university-based statistical consulting centre. Naturally occurring conversations and activities in the consulting sessions provided opportunities to observe questions, problems, and decisions related to selecting, using, and reporting statistics and statistical techniques in research. The purpose of this research is to learning opportunities for consultants and clients during statistical consulting sessions as means to assess the role of a statistical consulting centre in the research and teaching functions of a university.

Boulesteix, Wilson, & Hapfelmeier (2017) explained the goal of research in methodological computational statistics is to develop data analysis tools that are themselves superior to the

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existing tools. The methodology of the evaluation of medical interventions continues to be discussed extensively in the literature and it is now well accepted that medicine should be at least partly "evidence-based". Although statisticians are convinced of the importance of unbiased, well-thought-out study designs and evidence-based approaches in the context of clinical research, we tend to ignore these principles when designing our own studies for evaluating statistical methods in the context of our methodological research.

Reid, A. & Petocz, P. (2002) elaborated the "research practice gap," the authors extend evidence based principles to statistics instruction in social science graduate education. The authors employ a Delphi method to survey experienced statistics instructors to identify teaching techniques to overcome the challenges inherent in teaching statistics to students enrolled in practitioner-oriented programs. Among the teaching techniques identified as essential are using real-life examples, requiring data collection exercises, and emphasizing interpretation rather than results. Building on existing research, preliminary interviews, and the findings from the study, the authors develop a model describing to the strength of the link between research and practice.

3 Mathodology

Scientific Research Action of Statistics

Statistical analysis and statistical thinking involve much more than manipulating numbers using set formulas (Reid & Petocz, 2002; Wild & Pfannkuch, 1999). Producing, composing, applying, using, understanding, or communicating statistics requires knowledge, heuristics, communication skills, and a facility to capitalize on the social situation. Gephart (1988) coined the label "ethnostatistics" to refer to community-specific approaches that shape the use of statistical methods in research. The field of ethnostatistics involves the "empirical study of how professional scholars construct and use statistics and numerals in scholarly research" (Gephart, 2006). Gephart (1988, 2006) delineated three general areas of scholarship within ethnostatistics: (a) ethnographic studies of groups who produce statistics (Latour & Woolgar, 1986; Lynch, 1985), (b) analyses of the technical and practical assumptions involved in producing statistics (Cohen, 1994; Lieberson, 1985) and (c) analyses of the use of statistics as rhetorical or persuasive devices in research publications (McCloskey, 1985; Roth, Bowen, & McGinn, 1999). All three areas of scholarship reveal that contingent practices and artful decision making in statistical analysis.

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Research Process

Traditional research process has the following main points:

1. Statement of Research theory.
2. Specification of the mathematical model.
3. Specification of the statistical model.
4. Obtaining the Numerical data or Information.
5. Estimation of the parameters of the model.
6. Hypothesis testing Procedures.
7. Forecasting or prediction.
8. Using the model for control or policy purpose.

Data Collection and Analysis

Following ethics clearance from the host university, we documented statistical consulting sessions for four months. One or more student consultants and university-based clients seeking statistical advice attended each session. During the sessions, we took fieldnotes and participated in the discussions as appropriate. After the sessions, we expanded these fieldnotes to provide detailed case records for each observed session (Emerson, Fretz, & Shaw, 2001; Patton, 1980). We used open coding and constant comparison to analyze the data (Charmaz, 2006; Dye, Schatz, Rosenburg, & Coleman, 2000). We read and re-read my fieldnotes and case records, marking significant events and themes. Through this process, we identified key themes that we then used to code the entire data corpus. After arriving at a set of key themes, we sought confirmation of my interpretations from two sources.

First, we compared my claims to the statistical consulting handbook that was required reading for the student consultants (Boen & Zahn, 1982). We read the book from cover to cover, noting how the text related to the themes and examples from my fieldwork. The text is a well-respected handbook on "human" factors in statistical consulting that is recognized as a "classic" (Cabrera & McDougall, 2002). This review provided a partial check on the representativeness of these consulting sessions. For added resources, we also consulted other texts on statistical consulting (Cabrera & McDougall; Derr, 2000; Hand & Everitt, 2008; Rustagi & Wolfe, 1982). These comparisons revealed a close match between interpretations drawn from fieldwork and the topics addressed in statistical consulting texts.

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Second, we reviewed and approved a written report of the analyses. We endorsement of my interpretations served as a "member check" (Lincoln & Guba, 1985), demonstrating that the descriptions of the consulting sessions held for an "insider," that is, for the person who ran the service. At the same time, securing approval for this analysis complied with the standard consulting agreement whereby clients were expected to acknowledge assistance they received from the centre and ensure the centre approved their interpretations.

As Creswell and Miller (2000) argued, it is critically important in qualitative research to consider credibility from the perspectives of the researcher, the research participants, and the target audience for the research. These two review strategies provided increased assurance and other statisticians and statistics educators deemed the key themes presented here as credible and useful.

4 Discussions

Statistical Science

Statistics is the study of the collection, analysis, interpretation, presentation and organization of data".It is the role of statistics to identify and quantify important effects and relationships before any explanation has been found, and one of the most common means for doing so is to use empirical data to reject a "null hypothesis" that there is no relationship or no effect. There are countless scientific advances that would not have been possible without the use of such statistical methods. Typically, these advances are made in the discovery phase when evidence or scientific theory suggests that a relationship or effect might exist, and studies are designed to test the extent to which that can be verified statistically. Only after such studies have indicated that there is almost certainly a relationship do scientists begin to search for a cause or justification. For instance, the link between smoking and lung cancer was first explored when a physician noticed that his lung cancer patients tended to be smokers. Numerous studies were then done to explore the link between smoking behavior and subsequent lung cancer, and a statistical relationship was established long before a causal mechanism was determined.

Research with Statistics

The term research is much stricter in science than in everyday life. It revolves around using the scientific method to generate hypotheses and provide analyzable results. All scientific research has a goal and ult mate aim repeated and refined experimentation gradually reaching an answer. It is important for researchers and also consumers of research to understand statistics so

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that they can be informed, evaluate the credibility and usefulness of information, and make appropriate decisions.

Now statistics holds a central position in almost every field like Industry, Commerce, Trade, Physics, Chemistry, Economics, Mathematics, Biology, Botany, Psychology, Astronomy, Information Technology, Astrostatistics, Business analytics, Biostatistics, Econometrics, Environmental statistics, Statistical mechanics, Statistical physics, Actuarial science etc., so application of statistics is very wide. Statictics is very important when it comes to the conclusion of the research.

Data Interpretation

Drawing conclusions from data, making generalizations from specific instances, and making the seemingly unpredictable predictable is made possible by statistics but only when it is used with great caution. Critical thinking regarding the proper and valid steps necessary in making inferences from data is indispensible; judicious sampling from a population is the crucial first step. We will define the terms population, sample, and discuss how they are related.

6 Conclusions

In this way, statistics supplies designs of efficient experiments to save time-consuming trial and error. As above concrete cases show, double-blind tests for polls, intelligence and aptitude tests, and medical, biological, and industrial experiments all benefit from statistical methods and theories. The results of all of them serve as predictors of future performance, though reliability varies. All such operations are related to estimation, hypothesis testing, least square method, probability, regression. The above cited cases just scratch the surface of the vast iceberg of statistics.

Thus without statistics, we would have been totally helpless as we are confronted with the data overwhelmingly abundant. Statistics in this way remains our sole sharpest tool science has on hand, so sharp and effective in fact that we are often induced to wholly rely on it as if it were our good-given favorite. In this situation, we must remember statistics is an aid to science.

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