

## Teaching Philosophy

### Raphael Nishimura - Survey Methodology

More than ever, we are swamped daily with data in the news and on social media. Much of these data come from surveys conducted by governmental agencies, academic institutions or private corporations. Consciously or not, we are constantly making decisions and forming opinions based on these statistics. Hence, understanding how these data were collected, processed, analyzed and transformed into the information ultimately reported to the public can help us become more well-informed and efficient citizens. Survey methodology provides a coherent and well-organized framework that can help us understand such processes. Using this framework, I have three learning goals for my students that I believe are fundamental to have a complete understanding of how surveys work: (1) to comprehend the basic ideas and principles of the methods used in surveys, (2) to identify the assumptions underlying these methods and assess the consequences when they are not met, and (3) to analyze critically the results of a survey, capable of pointing out whether the methods employed are adequate and the consequences for the survey's results in case they are not.

Survey methodology relies heavily on statistical theory, and therefore utilizes rigorous mathematical derivations and formulae. These are often intimidating to students, especially those without a background in mathematics. In my experience, however, as both a student and teacher, I came to realize that the ability to comprehend the meaning of these mathematical theories and expressions and apply them appropriately is more important than the ability to derive and memorize them. For this reason, my primary goal as a teacher is to demonstrate the principles and ideas underlying the theories and methods in survey methodology to my students. For instance, instead of only enunciating and deriving the central limit theorem (CLT), I will discuss with my students the motivations and reasons to use the CLT in a survey context, demonstrating how the theorem works through a series of computer simulations, and work with them in some applications of the CLT using survey examples. Further, I am a strong proponent of using technology as a pedagogical instrument. I have been incorporating different types of technology into my teaching, such as chat room discussion and screencast video tutorials. These types of tools can enhance the understanding of more abstract concepts for students with different learning styles and paces. Throughout the semester, I will frequently employ short quizzes with multiple choice and open-ended questions to track students' understanding of critical ideas and evaluate which concepts need to be reviewed and reinforced. I will also assign homework with more computational exercises to evaluate how well they can apply these concepts to real-world situations.

As a second learning goal I have for my students, I expect they will learn to identify the assumptions that the methods and models used in surveys require. This is a critical aspect of students' education as the results and conclusions of a survey are only as good as the assumptions that the techniques used to find them make and how adequate these assumptions are in face to the complex reality we are trying to understand. To successfully achieve this goal, it is first necessary to know my students' backgrounds. For this reason, I try to get to know my students as much as possible throughout the course, not only in terms of their academic

performance and expectations, but also their personal interests and career objectives. I have found success reaching out students through informal conversations individually or in small groups at the beginning and end of class. In a more formal context, at the beginning of the term, I employ a survey to assess my students' prior knowledge on the content of the course and its prerequisites. Understanding my students' backgrounds will allow for group discussions of existing misconceptions about survey methods what are the assumptions they are making about these methods. Then I will link these finding to the implications that an inadequate assumption can have on survey's results. For instance, I will use a preconception check to verify how many of my students have some of the most common misconceptions in sampling and then, after presenting the results of this test, I will ask them to discuss in groups what assumptions they were making to answer these questions and how they could impact the results of a survey. To assess the success of this learning objective, I will use open-ended questions in the midterm and final exams about a specific survey problem and ask students to identify the assumptions of the methods and models that could be used to solve that problem. I will also evaluate how they connect these assumptions to the consequences if they are not met.

Building on the previous two goals, another learning objective I have for my students is for them to develop a critical attitude towards surveys. While it has never been easier to create surveys using web survey software, such as Survey Monkey or Qualtrics, the costs and challenges of conducting high-quality surveys have been only increasing. Therefore, it is essential to be able to distinguish surveys of different standards. One way in which I motivate students to start thinking about this is through discussion of case studies in which the survey results produced estimates that were terribly wrong, such as the American presidential election in 1948. At this time, the dominant polling company falsely indicated that Dewey would win the election, but Truman ended up being elected. Even more important than criticizing is understanding the limits and constraints of a survey. For this purpose, I have been conducting a course project in which the students have to design the sample of a survey based on some of my own previous consulting experience. They have the chance to test their understanding of the material covered in the lectures and apply it to a real-world problem. Activities like this allow me to fully assess my students' comprehension of the ideas and principles of survey methodology and how they translate them into real life applications.

As the famous statistician Samuel S. Wilks stated on his presidential address to the American Statistical Association in 1951, paraphrasing Herbert G. Wells, "Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write". I believe this day has long arrived, and promoting and providing education and training in survey research is the way I found to contribute, as a teacher in this field, to form better, more informed and more efficient citizens to our society. I hope my enthusiasm for both teaching and research in survey methodology will awake an interest and scientific curiosity in some of my students, leading to the pursuit of a career in this area that demands many qualified professionals in the industry, government and academia.