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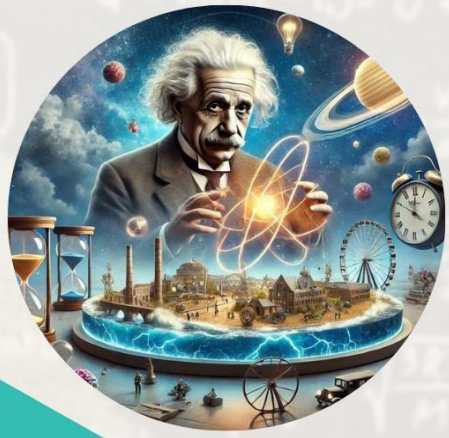

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BIOSTATISTICS COURSE EXPERIENCE AND THE USE OF SELF-EVALUATION TO DETERMINE LEARNING

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Abstract

Learning and comprehending statistics is a requirement for PhD students and people from many walks of life. Because of this, students from many walks of life are welcome in research technique and biostatistics classes, which covers a wide range of real-world issues. Participants often play a variety of roles throughout the research process; some may have only identified a study subject, while others may have gathered all of the necessary data. Additionally, there is disagreement on statistics, which stems from worries about the need for mathematical abilities rather than a lack of statistics per se. It is difficult to teach and evaluate learning when participants come from such a wide variety of academic backgrounds and specializations. The fact that everyone involved is so eager to learn statistical thinking and literacy is, nevertheless, a constant. The purpose of this article is to provide the results of an assessment method that allows students to create and complete their own test questions based on their own research issues. In addition to enhancing the participants' learning and comprehension, this technique also ensured that the study group as a whole adhered to appropriate statistical practice.

INTRODUCTION

varied people have varied opinions on the importance of statistical expertise in research since the word statistics is applied in different contexts. For instance, researchers may get population-based data and information on sampling concerns in official statistics, which also includes databases of variables essential to society. Statistics, also known as statistical science, is an independent scientific discipline; yet, applied statistics is an essential tool for research design and data analysis across the board.

Both theoretical advancements in statistical techniques and the availability of computer-intensive procedures capable of handling multivariate issues contribute to the continuous methodological development of statistical methods that may be applied to research concerns of varying complexity. The current major challenge, according to a review article by Liu and Agresti (2005) on the statistical methodological development of methods for ordinal data analysis, is to raise awareness of and use of the novel methods so that analyses and scientific conclusions are of higher quality and validity.

From my study in the life sciences, I've learned that people are more likely to stick with tried-and-true approaches rather than try anything new when it comes to statistics, even if the old ways are flawed or unsuitable (Svensson, 2001a, Svensson, 2002). The integrity of the study's scientific findings is compromised by this conduct. Applied research may suffer from a lack of quality due to the widespread availability of statistical software if researchers conduct their studies without adequate statistical training (Altman, 1994; Svensson, 2001a). Altman found that the vast majority of publications (about 80%) had flawed statistical procedures and conclusions after reviewing their statistical quality in highly regarded journals. He suggests that statisticians step forward and serve as article reviewers. Both Altman (1991) and Altman (1998) Improving research quality also necessitates informing and teaching non-statisticians about statistics and statistical literacy.

Learning and comprehending statistics is a necessity for PhD students across all fields. According to Svensson (2001a, 2002), supervisors tend to have a strong preference for statistical approaches, but they are also receptive to novel methods. Research courses in biostatistics and scientific techniques are available to everyone interested in meeting the need for training in solid research practices; as a result, students in these classes learn about a wide range of topics and their applications. Svensson (1998)a and (1998)b described the course outline at ICOTS 5. While some participants came to the study with little more than a subject in mind, others had previously gathered all of the necessary data. Additionally, opinions differ on statistics, but not on the need of statistics per such, but on issues related to the need for mathematical abilities, etc. It is difficult to provide consistent instruction when students come from such a wide variety of academic backgrounds and specializations. One thing that all participants have in common is their strong desire to learn and grow in their statistical literacy and critical thinking skills.
The purpose of this article is to provide some insights gained from an assessment strategy that allows students to create and complete their own test questions by drawing on their own knowledge and experiences. Also covered is the examination strategy for extended biostatistics courses.

TEACHING PRACTICAL BIOSTATISTICS.

My lectures are characterized by their focus on research groups that include supervisors and multi-professional PhD students. Prior ICOTS meetings have reported on the course outline and experiences with research group courses (Svensson, 1998a; 1998b; 2002). In this study, we'll look at how these problems affect research quality and how they relate to the relationship between pedagogy and student learning evaluations.
Essential components of an introductory practical biostatistics course include: It is interdisciplinary, and when students of statistics and biostatistics enrol in the same course, the non-statisticians' lecturers usually lead most of the classes. This helps the statisticians learn how to apply what they know from theory to real-world situations.

Because it is interactive, individual research topics were addressed by using methodological and statistical methodologies as appropriate. According to Svensson (1998)b, the measuring method is particularly relevant to the design difficulties. There includes extensive discussion of the measuring aspects of data, how to identify the relevant research variables, and what those variables mean in practice. Data qualities dictate the statistical approaches used for describing and analyzing the data. As an example, according to Svensson (2001a, 2001b, 2002), there is a colossal difference between the statistical approaches that work with ordered categorical data and those that work with quantitative data.
Statistical approaches are selected to describe and analyze the study topics posed by the participants.
Scientific publications related to the participants' areas of interest are reviewed. After then, in order to fully grasp the paper's contents, the participating statisticians will need to work together with PhD students from the applied research domains.
Evaluation of Students' Academic Progress
The courses are engaging because students apply what they learn about statistical techniques to their own research issues and because class conversations serve as both a learning tool and a means of evaluating what they've learned.
Students of statistics who take part in the activity have their communication abilities evaluated in a self-paced manner. Without a firm grasp of the real-world issues at hand, PhD candidates will struggle to carry out the necessary steps in the measurement process, write a thorough literature review, and demonstrate statistical literacy (i.e., understand and evaluate statistical documentation and methods).
Doctoral candidates have the option to substitute some of the test questions with ones that pertain to their own research for the final exam. Ideas for personal examination topics

issues with the following areas: scientific

documentation, analysis, interpretation, measuring method, descriptive statistics, research design, and addressing statistical difficulties.

The statisticians are tasked with resolving an applied research challenge with a dataset provided by a PhD student. The problem also includes specific criteria for data screening, theoretical statistical justifications, and the recommendation of potential alternative approaches to data description and analysis.

An Advanced Program in Applied Biostatistics

Many PhD students need a more in-depth understanding of statistical techniques for evaluating data from subjective judgments on rating scales, since questionnaires and rating scales are often used in the life sciences. Along with the prerequisites for collaborative research courses in rating scale data analysis and practical biostatistics (Svensson, 2001a). In order to prepare for data analysis for a scientific publication, PhD candidates in clinical or behavioral sciences are eligible to take an extended course in practical biostatistics. Statistical techniques for evaluating data from rating scales and surveys are the main emphasis of the lectures, although more complicated statistical approaches might be added as required.

A high-quality scientific paper is required to pass the test in all areas of methodology and statistics, including but not limited to: statistical problem-solving, statistical description and analysis, and design concerns.

EXPERIENCES GAINED FROM ASSESSING LEARNING BY STUDENT'S OWN EXAMINATION TASKS.

Earlier presentations I gave at ICOTS conference detailed the methods I use to organize research courses in which groups of students and their advisors work together, whether they are statisticians or not (Svensson, 1998a, 1998b, 2001a, 2002). The PhD students see the opportunity to create their own test problems as the pinnacle of learning assessment, and they eagerly embrace the challenge. My test concerns have been quite minor compared to the majority of the students'. It is really remarkable to see the joy on students' faces when they complete more challenging assessment assignments than what is asked of them. They also express gratitude for the opportunity to acquire sound statistical practices, which they can then use to their own study.

As a teacher, I find this participatory method of evaluating student progress to be challenging and time-consuming, but ultimately rewarding. As a reward, I get to see the participants' growing understanding of the strengths and weaknesses of statistical approaches. Students learn to value and take ownership of data management and analysis, which is important since the outcomes may inform evidence-based healthcare, rehabilitation, and other societal choices.

The study team as a whole benefited from this method, and the participants' knowledge and comprehension were enhanced as a result. Since they often aspired to be co-authors of the research papers, members of the research group are obligated to accept acceptable statistical performance in at least one of the papers regardless of their view of non-traditional statistical approaches.

An additional outcome of this technique of evaluating learning is the dissemination of sound statistical practices via the publication of articles in scholarly publications spanning a variety of fields (Altman, 1998, Liu & Agresti, 2005). Table one below provides a few instances.

Table 1
Examples of published examination papers of various disciplines written by participants in research courses of Biostatistics.

Paediatric ophthalmology	Hellström et al., 1997; Hellström et al.1998
Paediatric radiology	Müller et al., 2000
Occupational therapy	Gosman-Hedström & Svendsson, 2000, Claesson&Svensson, 2001, Dahlin-Ivanoff et al, 2001
Paediatrics	Berntson & Svensson, 2001; Berg, 2002
Social work	Starke&Svensson, 2001
Radiology	Svensson et al, 2002a, 2002b.
Immunology	Lagging et al., 2002; Westin et al. 2002
Nursing research	Forsberg et al, 2002
Neuropsychology	Engman et al., 2004
Physiotherapy	Lund et al., 2005

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For example, Altman (1998). Data analysis for medical publications. Medical statistics, 17, 2661–2674.

Berg et al. (2002) collaborated with Trollfors and Hugosson as well as Fernell and Svensson. Behavioral traits of children with bacterial meningitis followed over an extended period of time. The citation is from the European Journal of Pediatrics, volume 161, pages 330-336.
Leonard Berntson and Erik Svensson (2001). Scale and rater matters in pain evaluation in JCA children. Journal of Pediatrics, 90, 1131-1136.
Svensson, E. and Claesson, L. (2001). Functional independence measure and Sunnaas index of ADL are two examples of paired ordinal data that may be used as measures of order consistency. Article cited as 33, 1-8 in the Journal of Rehabilitation Medicine.
An article published in 2001 by Dahlin-Ivanoff, Sonn, and Svensson. Create an ADL tool for aging eyes with AMD. Rehabilitation and Disability, 23, 69–79.
The authors of the 2004 article are Engman, Andersson-Roswall, Svensson, and Malmgren. Assessment of group and individual memory alterations after temporal lobe excision for pharmaco-resistant partial epilepsy: a non-parametric study. The citation is from the Journal of Clinical and Experimental Neuropsychology, 25, 943-954.
Publication: 2002 by Forsberg, A., Bäckman, L., and Svensson, E. A prospective research on the coping abilities of liver transplant patients in the first year after the procedure. Published in the Scandinavian Journal of Caring Sciences, volume 16, pages 345–352.
E. Svensson and G. Gosman-Hedström (2000). Disabilities and Rehabilitation, 22, 702–715, reports on the reliability of the Functional Independence Measure and the Barthel ADL questionnaire.
In 1998, Hellström, A., Hård, A.L., Niklasson, A., Svensson, E., and Jacobsson, B. completed the project.As a general vascular phenomena, abnormal retinal vascularization occurs in premature children. Publication: The Lancet, volume 352, pages 1827.
A. Hellström, E. Svensson, and K. Strömland (1997). Measurement of the eye in children with fetal alcohol syndrome and in otherwise healthy Swedish youngsters. Scandinavian Journal of Ophthalmology, 75, 423-428.
Liu and Agresti (2005) write about...The analysis of ordered categorical data: An overview and a summary of current advancements. TESTS, 14, 1–73. In 2002, Laggaard, Westin, Svensson, Aires, Dhillon, Lindh, Wejstål, and Norkrans published a study. Fibrosis worsens in hepatitis C virus infections that go untreated. Circulation, volume 22, pages 136–144.
An article published in 2005 by Lund, I., Lundeberg, T., Sandberg, L., Norrbrink Budh, C., Kowalski, J., and Svensson, E. A cross-sectional description of pain etiology groups reveals that visual analogue and

verbal rating pain measures are not interchangeable. doi:10.1186/1471-2288-5-31 http://www.biomedcentral.com/1471-2288/5/31 BMC Medical Research Methodology, 5,31 (2006).

A study conducted by Müller, L., Bergström, T., Hellström, M., Svensson, E., and Jacobsson, B. (2010). Normative ultrasonic technique for measuring the thickness of the detrusor muscle in youngsters. Volume 164, Issues 134–138, The Journal of Urology.
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Based on a 2002 publication by Westin et al., the authors list the following: Lagging, Spak, Aires, Svensson, Lindh, Dhillon, Norkrans, and Wejstål.When people with hepatitis C virus infection who have not received treatment consume moderate amounts of alcohol, the advancement of fibrosis speeds up. Vol. 9, Issue 4, in the Journal of Viral Hepatitis.