# Creation and Implementation of Methods Modules in Introductory Psychology Courses

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## Project Description

**Context and Background:** The Department of Psychology has a large student body and, in a given academic term, has the opportunity to teach and influence over 2,000 students, from a variety of disciplines, who enroll in our introductory courses of PSYCO 104 and PSYCO 105. As a department, we aim to provide our students with a well-rounded education in psychology, requiring the completion of both arts and science psychology courses. We offer a number of opportunities for students to gain valuable research and practical work experience (e.g., honours program, internship program). This exposure is considered extremely valuable and advantageous for students' future placements in either graduate school, a professional school of study, or the workforce. However, we are one of a very small number of psychology departments within Canadian Universities that still does not teach statistics within the context of their own program. Though our students are required to complete statistics instruction, our current problem is two-fold: 1) there is only one mandatory statistics course required for psychology students (Note: honours students must complete an additional methods course, offered in psychology, at the second year level (PSYCO 212), and 2) the one mandatory statistics course must be completed within the Department of Mathematical and Statistical Sciences (STAT 151). We feel that the amount of statistics education currently required of our students is insufficient and the format in which they are learning the material does not adequately demonstrate the applicability of statistics to their field of study.

Hassad (2009) states that we are experiencing a global information explosion. The need to measure and explain variability, using statistics as the tool to analyze uncertainties and complexities in life and society, is the greatest among the health, social, and behavioural sciences. Additionally, quantitative information is not just contained to a classroom, but exists everywhere in society. For example, it is presented in marketing and advertisements, reported by politicians and media, and used by various organizations to determine change in policy or practices (Hulsizer & Woolf, 2009). As a tool, statistics can have a protective factor, such that individuals do not "fall prey" to believing presented information simply because it is quantitative in nature, nor blindly trusting information because it is presented via popular media. Given this, statistics education and the need for statistical literacy is particularly relevant, even fundamental (Hulsizer & Woolf, 2009). If the Department of Psychology is to be providing its students with the adequate knowledge, skills, and tools to allow them to succeed within and beyond their post-secondary education, providing appropriate statistics education needs to be one of our fundamental goals. The feasibility of offering more statistics courses within the Department of Psychology has been investigated, but, unfortunately, the amount of resources required to accommodate our large number of students in any new mandatory statistics course is not available at this time.

Moving forward, the reliance on the Department of Mathematical and Statistical Sciences does not adequately address the problem that many students do not necessarily view statistics as a useful course or applicable to their field of study and, therefore, place negative value judgments

on the study of statistics and perceive it to be a difficult subject (Garfield & Ben-Zvi, 2007). Hassad (2009) states that statistics instruction that is primarily mathematical can be "misguided" and suggests that the teaching of statistics should focus on helping students learn how to form and think critically about arguments involving statistics. In this way, statistics is closer to the philosophy of science, which involves critical thinking and practical reasoning. Also, there is a greater diversity of students in today's introductory statistics courses, where few are drawn to the course because of an immediate practical need, and there exists a variety of levels of quantitative capabilities and sophistication (American Statistical Association (ASA), 2005). There is a general consensus in the literature that statistics anxiety is a real phenomenon that exists in undergraduate and graduate students, in a variety of disciplines (Conners, Mccown, & Roskos-Ewoldsen, 1998; Dillon, 1988; Forte, 1995; Garfield & Ben-Zvi, 2007; Lalonde & Gardner, 1993; Onwuegbuzie & Wilson, 2003). Students experience apprehension, phobia, and negative attitudes toward statistics, which can influence their motivation and performance (Dillon, 1988; Forte, 1995; Lalonde & Gardner, 1993).

As a psychology department, we have the breadth of knowledge to understand these cognitive and emotional challenges in our students and need to consider adjusting the current approach to how statistics education is being offered in our degree programs. In the ASA's (2005) GAISE Report (Guidelines for Assessment and Instruction in Statistics Education), the development of statistical literacy and the ability to think statistically is emphasized. Involved in this is the belief that students should develop a conceptual understanding, rather than just knowledge of procedures, for a variety of key statistical concepts (e.g., natural occurrence of variability, association not inferring causation, statistical significance not implying practical significance, recognition of biases in survey and experimental research, sampling distributions and their use in significance testing, and confidence intervals). This proposed project aims to address the challenge of providing this quality statistics education to our students, within our own department, in the face of limited resources, such that they are better able to see its relevance and apply its value in the field of psychology.

**Proposed TLEF Project – Methods Modules:** The idea of methods modules was first proposed by the principal applicant and preliminary work has already identified the key statistical concepts psychology students should know, understand, and be able to apply at the various levels of their degree. For first year students completing PSYCO 104 and PSYCO 105, the majority of these topics are briefly discussed in the textbook, but vary in lecture coverage, depending on the instructor. Methods modules for these courses would contain a more in depth elaboration of these concepts and develop a knowledge base from which to build on throughout the curriculum. Since all psychology students must complete these two courses, it provides an opportunity to standardize the presentation and format of the teaching and learning of the initial statistics and methods concepts, specifically related to psychology.

To minimize encroachment on each individual instructor's course plan and schedule, it has been decided that these introductory modules will be offered online. Students can progress through the content at their own pace, though deadlines will be set for each component of the module. It is estimated that students will have approximately 3 weeks to complete each component. The modules will teach statistics and methods material and demonstrate its application in psychology using various formats, such as text-based information, departmental generated screencast videos,

videos from other sources deemed to explain and demonstrate content in a particularly interesting and useful way, and applets, which allow students to interact with data and view such things as graphical representations.

The use of online modules in psychology courses is not a new concept, particularly for PSYCO 104 and PSYCO 105. Our previous introductory component of "Information Literacy" required students to complete online assignments for course credit. Though the technical aspects of student access, completion, and submission functioned well, the main disadvantage was the amount of time required by teaching assistants to grade assignments, given the large enrollment. Keeping this in mind, and to foster the success of online methods modules, testing associated with the statistics and methods content will incorporate mastery of learning, as proposed in the Keller Plan, implemented previously in statistics instruction (Herzberg, 2001). Within our eClass system, we have the capacity to generate tests from a set of developed questions and completed tests can be graded automatically, given a particular type of question format. Students can submit a completed test, view their results with automatically generated feedback, and choose to complete the test again, if their performance does not meet a set standard. Each generated test will contain different questions, but still cover the same statistics and methods content. This ensures that it is the concept that students must learn to apply, rather than basic memorization of the correct answer. Progression to the next module component will not be possible until the previous component test has been successfully completed. Once this occurs, the gradebook within eClass will update automatically. It has been suggested that within the context of test completion, particularly for students with statistics anxiety, untimed conditions for writing tests and open book assessments have been shown to be preferred and beneficial (Onwuegbuzie & Wilson, 2003).

The discovery and determination of all of these project factors has been partly due to a previous Centre for Teaching and Learning Summer Student Award, given to Maggie Salopek. Under the supervision of the co-applicant, Maggie worked collaboratively with our Psychology Interns, who are placed in our department each year through the Internship Program. With their knowledge of the eClass system, we were able to determine the functionality and capabilities of its use for the methods modules. Though these detailed aspects of module design were imperative in moving forward, module creation in the summer was slow due to limited quantity and quality of generated statistics and methods content. This proposal is requesting funding for individuals to be involved in the development of solid module content, under the supervision of the co-applicant. It is our preference to engage those who have a strong statistics background and, preferably, have taught PSYCO 104 and/or PSYCO 105. Also incorporated into the year plan is the piloting of these modules in actual classes. Feedback from this process will be used to overcome any difficulties with implementation, comprehension of material, and need for student support, such as provision for a methods modules teaching assistant.

**Innovation:** This project is proposing to increase psychology students' exposure to statistics education, within the Department of Psychology, without adding new courses to the current curriculum. It relies heavily on resources that are already in place in our department (e.g., psychology intern support and PSYCO 104 and PSYCO 105 instructor implementation). The statistics instruction will be offered to students in an electronic format, which they are familiar with, allowing them to self-pace their learning and revisit content at any time (e.g., videos, etc.).

The mastery of learning approach and the creative nature with which the statistics and methods content is presented takes student intrinsic factors of statistics anxiety and apprehension into account.

**Collaboration:** This is a departmental effort and success of this project involves collaboration with individuals such as psychology faculty (e.g., content generation, module design, and implementation), interns (e.g., design and technical support), and graduate students (e.g., content generation and assessment of pilot work).

**Evaluation:** As mentioned previously, there will be a pilot process, where students will be asked to offer feedback about such things as the ease of use of the online modules and perceived applicability of the content. Faculty can provide feedback about the implementation of the modules and how it influenced their teaching. This information will be collected more than once throughout a term (e.g., middle and end of term). It is suspected, with strong statistics and methods content generated over the Spring, Summer, and Fall sessions of 2017, pilot implementation could occur in the Winter term of 2018.

**Sustainability/Impact on students:** Though the methods module project requires more resources upfront, once piloted and successfully implemented into PSYCO 104 and PSYCO 105, it is estimated that they can operate and be maintained with minimal effort. Further development of material, to enhance content, could be added over time. This initial effort is deemed extremely worthwhile, given the need for development of statistics knowledge and literacy in our students. Additionally, to maintain and build on this knowledge, it is forecasted that further modules will be developed for later levels of the curriculum.

**Dissemination:** The experience gained from this work will be valuable to instructors and administrators in other departments and may be beneficial to the field of psychology in general. The process of module creation and ultimate implementation and success can be shared with other departments who wish to work together in the creation of their own versions of such modules. Additionally, results from this work could be presented at conferences that discuss teaching in the field of psychology, such as the Vancouver International Conference on the Teaching of Psychology.

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