Turning our GAISE toward Departments of Psychology

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Abstract
Psychology is a popular major with thousands of graduates yearly. This major usually requires courses in statistics. Recently, statistics educators focused on the quality of the introductory statistics course, produced the GAISE College Report with a set of recommendations for the course. Although these educators recognized that the introductory course is a family of courses across the disciplines, it is unclear how familiar psychology departments are with GAISE. This paper provides information on this issue by describing statistics education in the psychology departments of the member institutions of the GLCA. The content and structure of the research methods and statistics courses required for the psychology major were examined, with special emphasis placed on GAISE. The findings point to the need for a bridge between statistics educators and psychologists who teach statistics.

Key Words: Statistical education, GAISE College Report, psychology departments

1. Background

Psychology is one of the most popular college majors in the United States (Brewer, 2006). As a major, psychology produces thousands of graduates annually. The National Center for Education Statistics (NCES) indicates that in the most recent academic year for which data are available (AY 2006-2007), over 90,000 bachelor's degrees in psychology were conferred by degree-granting institutions in the United States, which was approximately 6 percent of all bachelor's degrees conferred in that year (NCES, 2009).[1] This high level of popularity is not just a recent phenomenon. An examination of NCES data for the decade from AY 1997-1998 through AY 2006-2007 reveals that nearly 800,000 psychology bachelor's degrees were conferred across that ten-year period (NCES, 2009)[2] and when the most recent 25 years of NCES data are examined, one can see that well over 1.6 million bachelor's degrees in psychology were conferred in the past quarter century.[3] Clearly there are many individuals living and working in the United States who obtained their undergraduate education in departments of psychology.

An important element in the psychology major is coursework in research methods and statistics (Brewer, 1997; Brewer, 2006; Friedrich, Buday & Kerr, 2000). In fact, in his chronicle of the development of undergraduate psychology curricula in the United States, Brewer (1997) refers to the methodology courses, which cover statistics, research methods, and psychometrics, as "crucial" elements of the psychology major. In his 2006 article, Brewer describes the work of the Task Force on Undergraduate Psychology Major Competencies appointed by the Board of Education Affairs (BEA) of the American Psychological Association (APA). This task force issued a report in 2002 which contains ten goals and related learning outcomes for the undergraduate psychology

major. The second of these ten goals deals with research methods in psychology and states that "students will understand and apply basic research methods in psychology, including research design, data analysis, and interpretation." The task force report may be found at http://www.apa.org/ed/guidehomepage.html under the link "National Learning Goals & Outcomes."

Given the extremely large numbers of individuals who major in psychology in college and the centrality of statistics in the psychology curriculum, it is logical to assume that a similarly extremely large number of college-educated adults receive their college-level statistical education in departments of psychology. Obviously, since some psychology majors also major or minor in mathematics or statistics, the number of psychology majors whose entire statistical education will have been obtained in a department of psychology will be less than the total number of psychology majors; however, it seems safe to argue that a staggering number of individuals across the years have received their total college-level statistical education in departments of psychology.

In recent years, there has been a growing interest in and emphasis on the quality of post-secondary statistical education (Cobb, 1992; Garfield, 2000; Moore, 1997). Although much of this attention has been focused on the general introductory course which traditionally is offered in departments of mathematics and/or statistics, there is an awareness among statistics educators that statistics is taught across many disciplines in today's colleges and universities. Clearly, given the tremendous popularity of the psychology major and the ubiquity of coursework in research methods and statistics within that major, an interest in the quality of college-level statistical education should lead the statistics educator to be interested in the quality of the introductory course not only in its traditional "home" in departments of mathematics and statistics, but also in departments of psychology.

1.1 The GAISE College Report

In 2003 the American Statistical Association (ASA) funded GAISE (Guidelines for Assessment and Instruction in Statistics Education) with the goal of developing ASA-endorsed guidelines for assessment and instruction in the K-12 curriculum and in the college-level introductory statistics course (GAISE Report). The GAISE College Report is the summary document written by the members of the GAISE college group in response to the ASA-funded request. The GAISE College Report presents a short history of the introductory college statistics course, summarizes the status of the introductory statistics course, and makes six recommendations for teaching introductory statistics at the college level. These six recommendations are: 1) emphasize statistical literacy and develop statistical thinking, 2) use real data, 3) stress conceptual understanding rather than mere knowledge of procedures, 4) foster active learning in the classroom, 5) use technology for developing conceptual understanding and analyzing data, and 6) use assessments to improve and evaluate student learning. The GAISE College Report includes numerous concrete suggestions for how to implement these six recommendations. In addition, the GAISE College Report is accompanied by an appendix that contains a number of valuable examples and activities which are consistent with the GAISE recommendations.

It is important to note that the GAISE College Report recognizes that, although much of the attention regarding statistics education has been focused on the general introductory course offered in departments of mathematics and/or statistics, "today's introductory statistics course is actually a family of courses taught across many disciplines and

departments" (GAISE College Report). It appears that the authors of the GAISE College Report had disciplines such as psychology in mind when they wrote the report and when they made their six recommendations. Although psychology as a discipline is not discussed in the GAISE College Report, it is likely that the authors of that report were aware of the important role played by statistics education in the psychology major.

1.2 Statistics Coursework in Departments of Psychology

Much of what is known about statistics coursework in departments of psychology has been revealed in a paper by Friedrich, Buday, and Kerr (2000) in which 255 U.S. undergraduate psychology programs were surveyed about their statistics and methods courses. Friedrich et al. (2000) found that 89% of the departments surveyed required some sort of methodology course and 93% required a statistics course of some sort.

Friedrich et al. (2000) found that the following statistical topics were covered in introductory statistics coursework at *most* of the institutions that responded to their survey: correlation, independent means *t* tests, analysis of contingency tables, simple regression, one-way between-subjects ANOVA, confidence interval estimation, and probability. These authors also found that *many* institutions also covered the following topics: one-way repeated measures analysis (including paired *t* tests), factorial between-subjects ANOVA, post-hoc tests, effect size estimation, assessing violations of model assumptions, other nonparametric tests (e.g., Mann-Whitney U test), psychometrics, and factorial ANOVA including one or more repeated measures. Finally, Friedrich et al. (2000) noted that only *some* institutions covered the following: multiple regression, focused contrasts and comparisons, statistical control through "partial effects," model comparison approaches, ANCOVA, meta-analysis, factor-analysis or other data reduction techniques and causal modeling such as path analysis.

Friedrich et al. (2000) reported that in 78% of the departments, the introductory statistics course was a prerequisite for at least some of the intermediate or upper level psychology courses. Friedrich et al. (2000) also found that 41% of the departments offered at least one advanced statistics course open to undergraduates, but that only 6% required an advanced course for the psychology major.

Despite the detailed analysis provided by Friedrich et al. (2000), there are a number of aspects of statistics education in departments of psychology that are unknown. In particular, it is unknown how much "statistics" versus how much "research methods" is being taught in the courses offered in departments of psychology, many of which have course titles such as "Research Methods and Statistics I." A second unknown is what statistical techniques faculty who teach those courses believe to be important for their majors to know. A third unknown regards the teaching methods being employed in those courses. A fourth unknown relates to the GAISE College Report and its recommendations. Specifically, it is unknown to what extent faculty teaching the research methods and statistics courses are familiar with the GAISE College Report and the recommendations.

1.3 Goals of the Present Study

The primary goal of the present study was to extend what is known about statistics education in departments of psychology. Because examining all psychology departments would have been an enormous undertaking beyond the capabilities of the author, the decision was made to focus on the twelve member institutions of the Great Lakes

Colleges Association, which includes the author's home institution. The Great Lakes Colleges Associate (GLCA) is a consortium of private liberal arts colleges located in Indiana (DePauw University, Earlham College, and Wabash College), Michigan (Albion College, Hope College, and Kalamazoo College), Ohio (Oberlin College, The College of Wooster, Kenyon College, Ohio Wesleyan University, Denison University), and Pennsylvania (Allegheny College).

This study will describe the research methods and statistics courses required for graduating with a bachelor's degree in psychology from the GLCA institutions. Emphasis will be placed on the GAISE College Report in this study. The primary audience for this paper is statistics educators, particularly those statistics educators who are interested in statistics education occurring outside the general introductory statistics course. A secondary audience for this paper is psychology faculty members who are interested in the research methods and statistics sequence and in issues of statistics education.

2. Method

The study took place in three phases: 1) internet phase; 2) department chair phase; and 3) instructor phase. In each of these phases, different information was obtained about the courses in the statistics and research methods sequence at the GLCA institutions.

2.1 Internet Phase

In the *internet phase*, the following information was obtained from the internet for each of the GLCA institutions: 1) a listing of all psychology courses and their course descriptions, 2) requirements for the psychology major and minor; and 3) a list of psychology faculty and their contact information. The main goal of this phase was to identify the applicable course or courses in the statistics and research methods sequence at each of the twelve GLCA institutions.

2.2 Department Chair Phase

In the *department chair* phase, each chair of the twelve GLCA psychology departments was contacted for a telephone interview. Note that all twelve departments participated in this phase, but that three of the twelve department chairs designated another faculty member to be interviewed. In the interview the following information was obtained for each of the applicable courses: 1) the number of course credit hours, 2) whether the course is a laboratory course, 3) whether the course is required for the major and/or the minor, and 4) what the prerequisites are for the course. The following questions also were asked: 5) how many sections of the course are taught per year and what the enrolment is per section, 6) what percent of the course is "research methods" and what percent is "statistics", 7) whether the course is interchangeable with any other course on campus, 8) the names of current faculty who have taught the course in the past two years, 9) if more than one person teaches the course, whether a common syllabus and/or common approach is used, and 10) whether the chair (if the interviewee was the chair) is aware of existence the Guidelines for Assessment and Instruction in Statistics Education (GAISE) College Report.

2.3 Instructor Phase

In the *instructor phase*, instructors were invited to provide information via an online survey. The online survey included a set of questions about statistics topics, software, and textbooks. Faculty were asked "Which of the following statistics topics do you think

are important for undergraduate psychology majors at your institution to learn prior to graduation?" To respond to this question, faculty could make a checkmark next to each statistics topic on a list. Faculty could select as many or as few of the topics as they wished. Faculty also could write in other options that were not provided on the list. Faculty were asked "Which of the following software programs do you think are important for undergraduate psychology majors at your institution to learn prior to graduation?" To respond to this question, faculty could make a checkmark next to each of a list of software programs. Faculty could select as many or as few programs as they wished. Faculty also could write in other options not provided on the list of programs. Faculty were asked to "Please indicate the textbook which is in your personal opinion the single best textbook on statistics for use with undergraduates." A blank space was provided for Faculty to write in their response. Faculty were asked to "Please indicate the textbook which is in your personal opinion the single best textbook on research methods for use with undergraduates." Faculty were given a blank space in which to write their response.

The online survey also included several questions about the GAISE College Report. The first of these was "Have you heard of the Guidelines for Assessment and Instruction in Statistics Education (GAISE) College Report which resulted from a Strategic Initiative funded by the American Statistical Association (ASA)?"

Three questions with the goal of tapping three of the six GAISE recommendations also were asked. The first of these questions was "When you teach statistics do you focus on hypothetical data or actual data or both?" This question obviously taps the recommendation about the use of real data (Recommendation 2). The response options were: I focus 1) exclusively on actual data, 2) much more on actual data than on hypothetical data, 3) somewhat more on actual data than on hypothetical data, 4) on hypothetical and actual data equally, 5) somewhat more on hypothetical data than on actual data, 6) much more on hypothetical data than on actual data, and 7) exclusively on hypothetical data. The second question was "When you teach statistics do you focus on computational formulas or definitional formulas or both?" This question was designed to tap the recommendation about stressing conceptual understanding rather than mere knowledge of procedures (Recommendation 3). The response options were: I focus 1) exclusively on definitional formulas, 2) much more on definitional formulas than on computational formulas, 3) somewhat more on definitional formulas than on computational formulas, 4) on computational and definitional formulas equally, 5) somewhat more on computational formulas than on definitional formulas, 6) much more on computational formulas than on definitional formulas, and 7) exclusively on computational formulas. The third question was "When you teach statistics do you focus on computer-based calculations or "hand" calculations or both?" This question was designed to tap the recommendation about using technology for developing concepts and analyzing data (Recommendation 5). The response options were: I focus 1) exclusively on computer-based calculations, 2) much more on computer-based calculations than on "hand" calculations, 3) somewhat more on computer-based calculations than on "hand" calculations, 4) on computer-based and "hand" calculations equally, 5) somewhat more on "hand" calculations than on computer-based calculations, 6) much more on "hand" calculations than on computer-based calculations, and 7) exclusively on "hand" calculations.

2.4 Participation

As mentioned above, all twelve institutions participated in the department chair phase.

Three of the twelve department chairs designated another faculty member to complete the interview.

The 46 course instructors whose names were obtained in the department chair phase were approached via email and asked to participate in the online survey. The resulting sample in the instructor phase was *N*=37. This represents an overall response rate of 80.4% of eligible instructors. At six of the twelve institutions the instructor response rate was 100%. The response rate was about 80% at two institutions, about 70% at two institutions, and about 50% at two institutions. Please note that because the author is one of the faculty members who teaches research methods and statistics at Allegheny College, the author was a participant in the instructor phase.

Of the 37 instructors who responded to the survey, 32.4% were Assistant Professors, 40.5% were Associate Professors, 24.3% were Professors, and 2.7% were "other." Of the 37 instructors who responded, 29.7% were tenure track, 62.2% were tenured, and 8.1% were "other."

3. Findings

It was found that all of the GLCA institutions require coursework in research methods and statistics for the psychology major and that eleven of the twelve institutions require a two-semester sequence in research methods and statistics for the major (see Table 1). This is evidence that the departments of psychology in the GLCA place a value on methodological issues in the discipline. The important role for research methods and statistics in the psychology curricula of the GLCA institutions reflects and is consistent with the national trends discussed above (see e.g., Brewer, 2006).

For the most part, the research methods and statistics courses required of psychology majors in the GLCA are taught within the departments of psychology as opposed to being taught in other departments. Note that 21 of the 23 courses shown in Table 1 are taught within the departments of psychology. Note, also, that the department chairs (or designees) indicated that the instructors of these psychology courses are members of the psychology faculty at their respective institutions. In fact, only two institutions, Hope and Kalamazoo, have a course in their research methods and statistics sequence which is taught outside the psychology department by non-psychologists. Thus, most of the instruction in research methods and statistics occurring in departments of psychology in the GLCA is being conducted by psychologists.

Table 1: Courses in the Research Methods and Statistics Sequence in the Psychology Departments of the 12 Institutions of the Great Lakes Colleges Association (GLCA) by Institution

Institution	*Semester 1*	*Semester 2*
Albion	Research Design & Analysis I	Research Design & Analysis II
Allegheny	Research Design & Statistics I	Research Design & Statistics II
Denison[a]	Research Methods in Psychology	*Topical Research Methods*
DePauw	Statistics for Behavioral Sciences	Research Methods
Earlham	Experimental Psychology	*no 2nd semester*
Hope	*Cognate Course*[b]	Research Methods
Kalamazoo	*Cognate Course*[c]	Experimental Methods
Kenyon	Statistical Analysis in Psychology	*Topical Research Methods*
Oberlin	Research Methods I	Research Methods II
Ohio Wesleyan	Quantitative Methods	Research Methods
Wabash	Research Methods & Statistics I	Research Methods & Statistics II
Wooster	Introduction to Statistics & Experimental Design	Research Methods in Psychology

Note. [a] The two-course sequence at Denison is for the BA. Denison also offers a BS in psychology which has a required third statistics course. Denison also requires two topical research methods courses. [b] At Hope, there are two eligible cognate courses, both of which are statistics courses offered in the Mathematics Department. At Hope the two courses in the sequence can be completed in either order [c] At Kalamazoo there are three eligible cognate courses, two of which are statistics courses offered in the Mathematics Department.

3.1 Models of the Research Methods and Statistics Sequence

Table 2 presents the information provided by the department chairs (or designees) concerning the percent of each course which consists of statistics as opposed to research methods. This information is displayed in the two right-hand columns in Table 2. For example, at Ohio Wesleyan, the interview response indicated that 90% or more of the first semester course consists of statistics content (i.e., more of a psychological statistics course) and that about 25% of the second semester course consists of statistics content (i.e., more of a psychological research methods course). For the purposes of this report, the percents in Table 2 have been rounded to the nearest 25, 33, 50, 67, 75, 90, or 100 percent. It is important to note that *all* courses in Table 2 have statistics content, even those courses which are predominantly psychological research methods courses, and that a large number of the courses in Table 2 have *substantial* statistics content.

Based on the information regarding the percent of statistics content and information provided in the interviews with the department chairs (or designee), different models for the research methods and statistics sequence in the departments of psychology in the GLCA institutions emerged. These models, which are presented in Table 2, are differentiated primarily by whether the sequence has a “separate course” or “mixed course” approach. Within the “separate course” approach, there are three variations: 1) separate psychological statistics and psychological research methods courses, 2) separate courses with psychological statistics followed by topical research methods in psychology, and 3) separate courses with a cognate statistics course and a psychological research methods course. Within the “mixed course” approach, there are three variations: 1) mixed courses with the first semester having more coverage of statistics than the second

semester, 2) mixed courses with the second semester having more coverage of statistics than the first semester, and 3) a single-semester mixed course.

Table 2: Models Observed in the Research Methods and Statistics Sequence in the Psychology Departments of the 12 GLCA Institutions by Institution

		Percent of Course with Statistics (as opposed to Research Methods) Content	
Model	*Institution*	*Semester 1*	*Semester 2*
Separate Courses: Psych Stats & Psych RM	Ohio Wesleyan	about 90%	about 25%
Separate Courses: Psych Stats & Psych RM	Wooster	about 90%	about 25%
Separate Courses: Psych Stats & Psych RM	Oberlin	about 50%	100%
Separate Courses: Psych Stats then topical RM	Kenyon	about 90%	*topical RM (varies)*
Separate Courses: Psych Stats then topical RM	Denison	about 67%	*topical RM (varies)*
Separate Courses: Cognate Stats & Psych RM	Hope	*cognate (100%)*	about 25%
Separate Courses: Cognate Stats & Psych RM	Kalamazoo	*cognate (100%)*	about 33%
Mixed Courses: Psych Stats & Psych RM in both	DePauw	about 75%	about 33%
Mixed Courses: Psych Stats & Psych RM in both	Allegheny	about 75%	about 33%
Mixed Courses: Psych Stats & Psych RM in both	Albion	about 50%	about 67%
Mixed Courses: Psych Stats & Psych RM in both	Wabash	about 25%	about 75%
Mixed Course: Psych Stats & Psych RM	Earlham	about 50%	*No 2nd semester*

Note. Psych Stats stands for psychological statistics, meaning, a statistics course taught in a department of psychology. Psych RM stands for psychology research methods, meaning a research methods course taught in a department of psychology. Cognate Stats course stands for a cognate statistics course, meaning a statistics course taught outside a department of psychology. The phrase topical RM stands for topical research methods course, meaning a course taught in a department of psychology in which research methods are taught in conjunction with a content area.

3.2 Statistics Content in the Research Methods and Statistics Sequence

Course syllabi were collected on a voluntary basis from the instructors of the psychology courses listed in Table 1 (note that syllabi were not solicited from instructors of the cognate courses). The contributed syllabi were examined with the primary goal of ascertaining statistical topics covered in the research methods and statistics sequence at the GLCA institutions. The analyses presented here pertain to the syllabi of all institutions with a two-semester sequence in psychological statistics and psychological research methods for which syllabi were contributed for both semesters of the sequence. The following statistical topics appear on the syllabi of the course sequence for *all* such institutions: descriptive statistics/central tendency/variability, sampling distributions, hypothesis testing, *z* scores, one sample *t* test, independent means *t* test, one-factor between-subjects ANOVA, correlation, and regression. The following statistics topics appear on the syllabi of the course sequence for *almost all* the institutions: chi-square, dependent means *t* test, one-factor within-subjects ANOVA. Other topics that appear on more than one syllabus are: effect size, confidence intervals, mixed-model ANOVA. Not surprisingly, the syllabi also include a number of topics related to research methods in psychology. In addition, it is important to note that the syllabi indicate that many of the courses focus on teaching ethics in research and American Psychological Association (APA) format for reporting research findings.

As part of the online survey, course instructors were asked to indicate which of a list of statistical procedures were important for undergraduate psychology majors at their institution to learn prior to graduation. The instructors' responses are presented in Figure 1. As may be seen in Figure 1, the instructors were unanimous in their support for *t* tests, simple ANOVA models, and the Pearson product-moment correlation coefficient. Strong support also was evidenced for regression and for the chi-square goodness of fit test. Reasonably strong support was shown for two-factor ANOVA models in which one or both factors are within-subject factors. The Spearman correlation procedure received some support. Very little support was given to multiple regression and MANOVA.

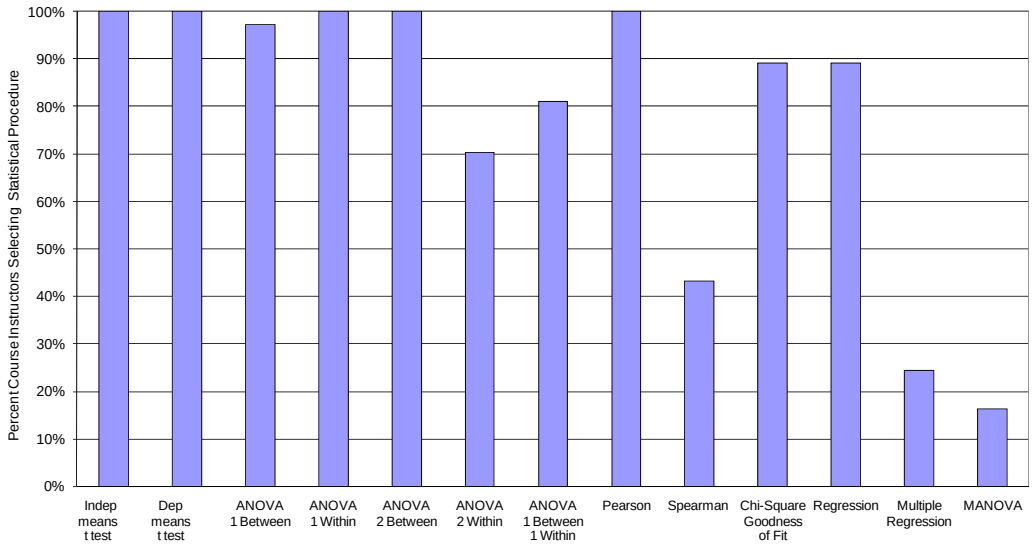

Figure 1: Percent of course instructors endorsing various statistical procedures as being important for undergraduate psychology majors at their institution.

Course instructors were asked to indicate if there any other procedures which they felt were important for psychology majors at their institution. A number of responses were obtained to this question. These responses were as follows: graphing, one-sample *z* test, one-sample *t* test, chi-square test of independence, non-parametric tests, confidence intervals, power analysis, effect size analysis, factor analysis, and multi-level models.

Instructors also were asked to indicate the textbook which, in their personal opinion, is the single best textbook on statistics for use with undergraduates. Slightly more than half the instructors did not indicate a textbook and those indicating a textbook were divided among eight different textbooks. The two most frequently selected textbooks were Gravetter and Wallnau (16% of instructors) and Howell (8% of instructors). Similarly, when asked about the single best textbook on research methods for use with undergraduates, slightly more than half the instructors made no response and the remainder were divided among nine textbooks. The two most frequently selected research methods textbooks were Shaughnessy, Zechmeister, and Zechmeister (14%) and Gravetter and Forzano (8%).

Lastly, in response to the question regarding which statistical software programs undergraduates at their institution should learn prior to graduation, instructors were virtually unanimous in selecting SPSS. Other than SPSS, the only software selected was Excel (selected by over half the instructors). The only other response obtained to this question, other than SPSS and Excel, was "Anything but R."

3.3 GAISE in the Research Methods and Statistics Sequence

Only one department chair indicated that he/she had heard of the GAISE College Report. Of the instructors, only six of 37 (16.2%) reported having heard of the GAISE College Report; however, in the interest of full disclosure, the author is one of those six and an additional two of those six are individuals who learned about GAISE from the author. If these three cases are excluded, then three of 34 (8.8%) reported having heard of the GAISE College Report.

Responses to the question "When you teach statistics do you focus on computational formulas or definitional formulas or both?" are displayed in Figure 2 below. Note that there is somewhat of a trend toward definitional formulas.

Responses to the question "When you teach statistics do you focus on computer-based calculations or hand calculations or both?" are displayed in Figure 3 below. Note that quite a few faculty members indicated that they focus on hand and computer calculations equally, but also that there was somewhat of a trend toward computer calculations.

Responses to the question "When you teach statistics do you focus on hypothetical data or actual data or both?" are displayed in Figure 4 below. This figure reveals a fairly strong trend toward using both actual and hypothetical data.

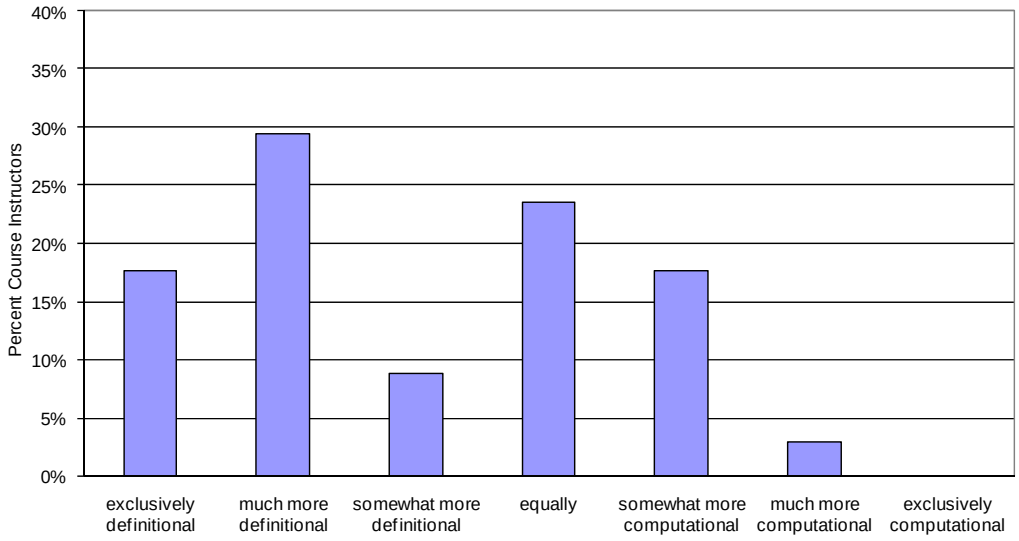

Figure 2: Responses to the question "When you teach statistics do you focus on computational formulas or definitional formulas or both?" Percent of course instructors endorsing the various response options.

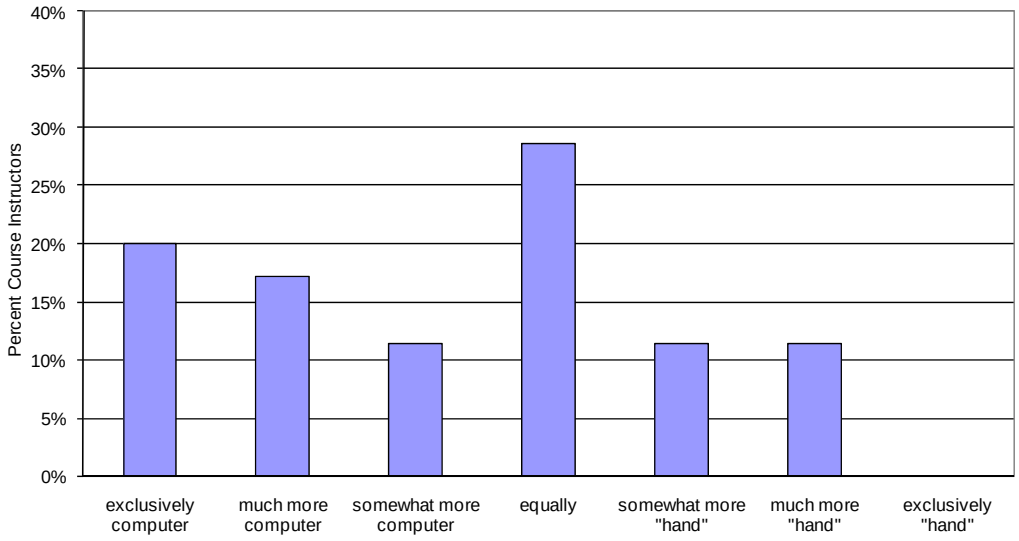

Figure 3: Responses to the question "When you teach statistics do you focus on computer-based calculations or hand calculations or both?" Percent of course instructors endorsing the various response options.

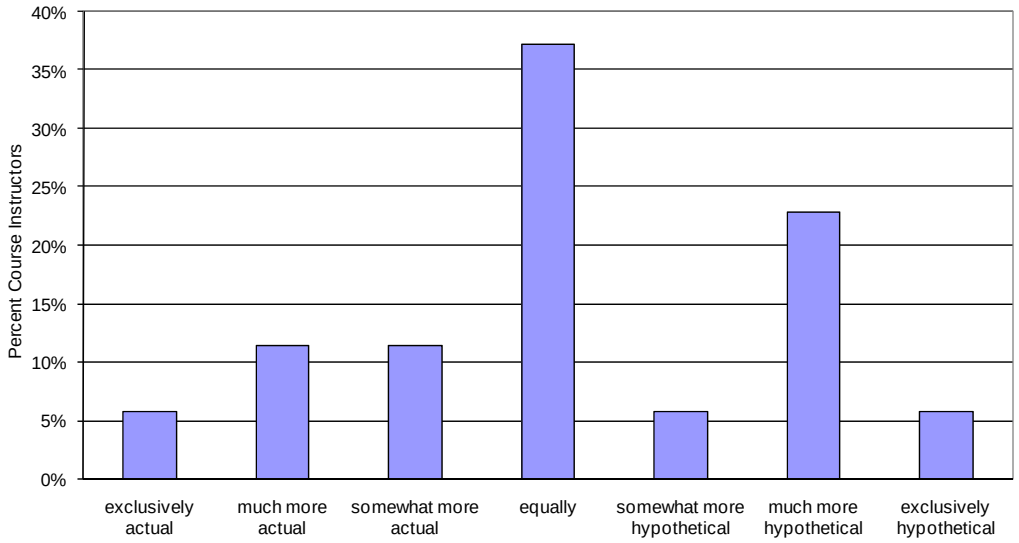

Figure 4: Responses to the question "When you teach statistics do you focus on hypothetical data or actual data or both?" Percent of course instructors endorsing the various response options.

An appendix of information of potential interest to the psychology departments at the GLCA institutions has been prepared and is being provided to those departments. This appendix contains information such as prerequisites and enrolment.

Discussion

Students completing the psychology major in eleven of the twelve GLCA institutions take two courses in research methods and statistics, consistent with national trends (Friedrich et al., 2000). Different patterns for these two-course sequences exist. In four of the eleven institutions with a two-course sequence, statistics and research methods are mixed together within the two-course sequence. In seven of the eleven institutions, statistics and research methods are taught more separately. The approaches at the GLCA institutions also differ in terms of when the greatest emphasis on statistics (relative to research methods) is placed. At some institutions the emphasis on statistics is greater in the first semester than in the second semester and at some institutions the emphasis on statistics is greater in the second semester than in the first semester. Note, however, that whichever approach is taken, statistical content is an important element in both semesters of the sequence. Statistical content also was found to be important in the one-semester course.

When the syllabi are examined, it is seen that a variety of statistics topics are covered in the research methods and statistics coursework in the departments of psychology in the GLCA institutions. At the heart of the these course are the topics of descriptive statistics, sampling distributions and hypothesis testing, *z* scores, *t* tests, one-factor between-subjects ANOVA, correlation, and regression. When asked which statistical procedures they believe are important for psychology majors at their institutions, instructors of the research methods and statistics courses strongly support *t* tests, correlation and regression, and a variety of ANOVA models. Instructors are less supportive of multiple regression and ANCOVA. These findings are relatively consistent with national trends (Friedrich et al., 2000).

Department chairs and course instructors in the research methods and statistics sequence in departments of psychology in the GLCA generally have not heard of the GAISE College Report. Due to limitations of the sample, it is unknown whether this lack of familiarity with GAISE in departments of psychology extends beyond the GLCA, but there is no reason to believe that the GLCA departments differ from departments at other institutions in ways that would tend to make the faculty at GLCA departments less aware than faculty at other institutions of the actions of the ASA. The present data suggest that those interested in disseminating the message contained in the GAISE College Report need to consider reaching out to members of psychology departments. If it is important to the ASA that instructors of introductory statistics courses across the disciplines are exposed to GAISE, then it appears that some outreach effort is needed.

It is obvious that statistics and statistics education are vitally important for the field of psychology and that departments of psychology devote substantial resources to offering coursework in statistics and research methods. It seems quite plausible to the author that departments of psychology would be very interested to learn about the GAISE College Report, the recommendations of the GAISE group, and the appendix that accompanies the GAISE College Report. Moreover, the author believes that psychologists who teach statistics and research methods would be interested to learn of the existence of the Statistical Education Section of ASA and to hear more about its activities. Because of this, the author recommends that steps be taken to build a bridge between statistics educators and psychologists who teach research methods and statistics. One such step would be to develop a link between the ASA, in particular the Statistical Education Section of the ASA, and Division Two of the American Psychological Association (the

division on the teaching of psychology). A second step would be for the ASA to offer psychologists (and those in other disciplines) who teach statistics on the college level an opportunity to affiliate with the Statistical Education Section of ASA. A third step would be for statistics educators to run workshops for or engage in informal conversations with psychology (and other) faculty member who teach statistics at their home college or university. The author believes that a bridge between statistics educators and psychologists who teach statistics would be mutually beneficial to the disciplines and to the endeavour of providing post-secondary statistical education.

Limitations

The study presented here has a number of limitations related to the sample, the study design, and the survey questions.

The sample was not representative. Only psychology departments in the Great Lakes Colleges Association (GLCA) were studied. In addition, although there was 100% participation at the department chair phase of the study, the participation rate for the instructor phase was 80%. While this is a good participation rate, it leaves open the possibility that the information obtained from the instructors who responded is not representative of all instructors in GLCA psychology departments. Another potential limitation worth noting is that the author is an instructor and, as such, participated in the instructor phase.

There were some limitations of the study design. Most notably, since the courses at the individual institutions often are taught in a way that encourages a high level of consistency in the content and teaching methodology, individual instructor responses are not, strictly speaking, independent. Another way in which responses were not independent occurred because some department chairs also were course instructors and thus were asked about the GAISE College Report twice (once in the department chair telephone interview and once in the online survey)

There also were limitations related to the questions asked in the project. The question which required the department chairs (or the designees) to indicate what percent of each course was statistics versus research methods has limitations in terms of the accuracy with which it actually measures the percent of the course devoted to statistics. Clearly, it is only a crude tool for assessing the statistics versus research methods content of the courses. The questions asked in the instructor phase also had limitations. In an effort to reduce the time burden of the survey, the questions were kept general. Because of this, instructors who teach more than one course in the sequence were not asked about each course separately. This resulted in an inability to map instructor responses to specific courses. In addition, there are other questions which could have been asked of instructors that were not asked in an effort to keep the survey short. It would have been informative to have asked more questions about various aspects of the GAISE College Report. It would have been particularly interesting to have asked the instructors to read the GAISE College Report and then assess their reactions to it.

Footnotes

[1] NCES data obtained from Table 271 Digest of Education Statistics 2008.

[2] NCES data obtained from Table 271 Digest of Education Statistics 2008 and Table 261 Digest of Education Statistics 2007.
[3] NCES data obtained from the above tables plus Table 250 Digest of Education Statistics 1998 and Table 243 Digest of Education Statistics 1995.

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Author Notes

The author has endeavoured to the best of her ability to represent accurately the requirements and practices in the departments of psychology at the twelve GLCA institutions; however, the information presented here should not be relied upon for advising purposes. Please see an advisor in the department of psychology of the appropriate GLCA institution for advising regarding coursework required for the major and for more information about specific courses.

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