THE TEACHING ASPECTS OF CONSULTANCY

Gabriella M. Belli, Virginia Polytechnic Institute and State University, USA

Research takes place within some context, with the researcher bringing to the problem a particular point of view. This context or underlying rationale may not be made explicit for the statistical consultant assisting a client in the research endeavor. Also, clients may focus on their desired goal and ignore issues such as proper sampling techniques, confidence intervals, or the type of evidence needed for strong inference. They may have unrealistic expectations for results given financial constraints or type of available data. An important task, then, for the consultant is to effectively provide instruction that helps develop an understanding of what is feasible and helps clarify the specifics of the project. This paper details the experiences of statistical and methodological consultants and how they dealt with instruction in the context of consultancy relationships.

INTRODUCTION

Statistical consulting is an all encompassing term. It is practiced in private and public organizations and covers everything from a brief interaction to a long-term collaboration on a major project. Consultants may be internal or external to an organization. In academic settings, the statistician consults with students, colleagues, internal departments and outside clients. Stegman (1985) described the discipline of educational statistics as having "a consulting role built into it" (p.270). Statistical consultants, irrespective of their primary affiliation, cross settings in their work. They must quickly learn the language of the setting they find themselves in and function within the boundaries appropriate for the interaction. They must make sense of the context within which their client is operating.

Sokol (1997) spoke of technical service providers working as internal consultants being better able to overcome frustrations in their organizational role if they "see themselves as 'teachers' who have a limited time to educate and have an impact on clients before they move on to other situations" (p.100). In describing the various roles that a statistical consultant must play, Kirk (1991) concluded with that of teacher, saying that "Good consulting rarely takes place in the absence of teaching - the two are inseparable" (p.30). This teaching role outside the classroom is implicit in articles for applied researchers, such as Allison, Gorman, and Primavera's (1993) which details questions commonly asked of statistical consultants, along with answers and recommended readings for the practitioner. Also, case studies are presented to document how particular analyses can facilitate clients and stakeholders to understand complex statistical results (e.g.,

McLinden and Jinkerson, 1994) and chapters in handbooks for various professions offer guidelines to specific analyses using examples from the practitioner's field (e.g., Belli, 1989).

That teaching is an integral part of statistical consulting is an accepted fact in the literature. How prevalent is this? How knowledgeable is the typical client? In what kind of consultancy situations is statistical or methodological teaching provided?

METHOD

In order to answer the above questions, an electronic survey was conducted using two e-mail address lists, one from the Special Interest Group of Educational Statisticians of the American Educational Research Association (AERA) and the other from a list of participants in the Fifth International Conference on Teaching Statistics (ICOTS-5). A total of 328 questionnaires were sent out, with 47 returning as undeliverable, producing an effective sample of 281. From 74 valid returns (a 26% response rate), 62 were complete and 12 indicated that they did not consult. Numerical data were summarized and the open ended questions subjected to a content analysis. In the discussion of each question, exemplary statements are used to capture the essence of what a number of respondents said. These statements are not to be interpreted as being definitive, but merely as providing the flavor of a set of responses.

Almost two-thirds of the 74 respondents are full-time faculty (64%) and an additional 14% teach as adjuncts. An academic institution is the primary affiliation for 78% of the respondents, with the rest in government, testing companies, research firms, school districts, or self-employed. The number of clients served in the past year ranged from 2 to 150, with a mean of 19, median of 10, and mode of 3. Over half the projects were small (59%), 29% were of medium size, and 12% were large.

RESULTS

Only eight of the 62 consultants had a single client type; the rest ranged between two to five different client types. Most worked with students on theses or dissertations (84%) and/or with faculty (76%). About half consulted with private agencies or business (58%), with school systems (48%), and/or with government agencies (48%). Twelve percent also consulted with a variety of other clients. Client types ranged from local

manufacturers to non-profit agencies; from individual doctors to pharmaceutical companies; from undergraduates with research requirements to postdoctoral fellows.

The results in Table 1 show the variability in responses to six questions about clients. All but two item means were almost centered on a 5-point scale. There was a fairly consistent variance of opinions about what information clients provide consultants and whether their expectations are unrealistic. Over half of the respondents (57%) felt that clients tended not to understand limitations and 81% indicated a need for briefings on statistical issues. These results are consistent with the verbal comments discussed below.

TABLE 1. Consultants' Perceptions About Their Clients

*Frequency with which clients provide_*	X.[a]	(sd)	5[b]	4	3	2	1
full descriptions of issues underlying study	3.1	(1.3)	18.3	18.3	26.7	25.0	11.7
clear guidelines for the project	3.0	(1.0)	10.0	18.3	36.7	30.0	5.0
specifics about type of information desired	3.2	(1.0)	10.2	32.2	28.8	27.1	1.7
*Frequency with which clients_*							
understand the limitations that may exist	2.4	(0.9)	1.7	8.3	33.3	41.7	15.0
expect more from results than is feasible	3.4	(1.1)	16.7	35.0	26.7	16.7	5.0
need a briefing on statistical issues	4.2	(1.0)	50.9	30.5	13.6	1.7	3.4

a X. = mean; sd = standard deviation

b Percents in response categories, where ranger is from 5 = almost always to 1 = never

The Typical Client's Knowledge Level

The first open ended question was about how knowledgeable the typical client was about the research process or about statistical issues. Over half of 60 respondents felt that their clients have limited statistical knowledge. The remainder predominantly felt that knowledge varied by client type or by area, and only 3% felt that their typical client was quite knowledgeable. The discrepancies in clients' background was expressed as ranging from "completely ignorant to very well informed," and from "the level of possessing a statistics degree to the level of the statistics phobic." The essence of a majority of the comments was captured by the statements that "generally, the professional clients are not particularly knowledgeable about statistics" and that they "have suppositions that we can do an analysis to 'prove' some point they want to make" but that they "are relatively unclear on how to analyze the data." One respondent felt that clients sometimes had

difficulty maintaining objectivity and that "they tend to distort outcomes in favor of their particular viewpoints." A respondent who felt that clients did not have a clear grasp of either statistical or research issues, added that "in a way, that's good; that's why we are hired." One respondent found it "fun" and another "very rewarding, but also demanding" to help clients learn while working on their own data.

Specific comments about consulting with students indicated that graduate students in applied areas had some introductory background in statistics, but "lack many of the skills to actually analyze the data they collect." Reactions were mixed about the relative knowledge in research methods and statistical issues, some feeling that their clients had a better grasp in one area while others stated the opposite. This may be, in part, due to distinctions not always being made between consulting with students versus professionals. Where the distinction was made, one perspective was that "students/ faculty have some reasonable stat background, but are often naïve about design issues," while "government/private clients vary all over the place." However, several stated that their clients were better versed in research methods than in statistics. Some said professional clients lacking in statistical knowledgeable tended to be quite knowledgeable in their content area and often were quick to grasp statistical or methodological issues.

Specifics of Informal Teaching

The second question asked for a description of a consulting situation where informal teaching was needed in order to help redefine a study or understand what was or was not feasible. Part of what emerged from the answers was a list of topics that read like a series of statistics, measurement, evaluation, design, and survey sampling courses. One respondent noted that often the initial statistical questions cannot be dealt with because "there are many measurement and design questions that need to be addressed" first. It was evident that some respondents provided short courses or training sessions for their clients as a vehicle to help them deal with their projects.

A prevalent theme that emerged dealt with limitations and helping clients see the limits of their data, of the design, or of the analytic procedures. A somewhat related issue was the apparent disconnect between clients' questions or research design and the proposed analyses. While this disconnect often related to students seeking advice on dissertations, it was also stated about consultations with principal investigators on grants and grant proposals.

A few examples were given of difficulties when statistical consultants are brought in at the 11th hour, and clients have unrealistic expectations. In one case, a grant dealing with the implementation of a school district's curriculum, a curriculum expert consultant had helped design an implementation plan with no provision for a control group but then expected the statistical consultant to "prove that it works" after the fact. In another case, longitudinal data had been collected using a coding scheme that was "inconsistent and incorrectly" applied across schools in a given state, producing many empty cells. The frustration of the statistical consultant seems obvious from the comment: "Here unfortunately, the longitudinal aspect of the study is lost forever since we cannot retrieve the missing scores. I was consulted AFTER all 5 years of data were collected."

Prevalence of Need to Instruct in Consultancy

The last open ended question asked if the need to instruct as well as assist a client was a rare occurrence or fairly common in consultancy. Only three out of 47 respondents said instruction was rarely needed. One person said that it was needed "to varying degrees" and the remainder of the responses to this question were that this is fairly typical, normal, or not unusual. It was seen as "part of the learning process" when dealing with students in university settings. One instructor, however, lamented about having to fill in "such glaring gaps in what they know" and that students who have to do a dissertation are "seldom given adequate preparation."

The main differentiation made between dealing with graduate students and professional clients dealt with how the instruction was received. One respondent felt that students were more receptive than professional clients. Another respondent, however, pointed out the fact that often clients have their own clients to whom they need to present results. Hence, they are more interested in learning whatever they need to in order to better explain or defend their work. The integral nature of instruction and consultancy was evident in the following comments: "You do both simultaneously" and "There is usually an element of instruction because otherwise there would be no reason to be consulted."

CONCLUSION

The most obvious conclusion is that there is no "typical" client or consulting interaction. And yet, similar statements were present in the written comments. Perhaps a

better approach would have been to ask for separate reactions to consultations with students and with professional clients. In this paper, the focus was on the statistical consultant as teacher. But, as Kirk (1991) noted, "both the consultant and the client assume the teaching role at various times during a consultation" (p.30). Only one respondent alluded to this, saying that "sometimes I'm the one who learns about the problem and then has to ponder its solution." Questions about how much the consultants learn from their clients would have been interesting. A continued look at the nature of the interactions, the time spent, the expectations of and value to both parties, and the resulting levels of satisfaction is warranted. Such study would add to the body of consulting literature and assist statistical consultants in their endeavor as well as provide input to the training of new consultants.

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