COMPUTING NEEDS OF SELECTED
SOCIAL SCIENCE PROGRAMS

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Introduction

In a paper presented at the 1977
ACM-SIGUCC Conference held in Kansas
City, we addressed several problems
social science computer users have
resulting from the symbiotic relation-
ships among research methodology,
statistics, and computing hardware
and software. The cursory research
conducted for that presentation
generally revealed that graduate
students in the social sciences are
severely deficient in their knowledge
of statistics and computing systems.
Nevertheless, we found that despite
this lack of knowledge students often
were required to use computer
facilities and quantitative methods.
This usage frequently meant that the
user services consultants were called
upon to provide social science computer
users with statistical assistance as
well as knowledge of the computing
system. We concluded our presentation
with a number of specific recommenda-
tions designed to help consultants
deal with social science computer
users.

In an attempt to delve into the
problems that user service consultants
have advising social science computer
users, we conducted a nationwide mail
survey of approximately 300 colleges
and universities that offer graduate
programs leading to either a Master
of Public Administration (or its
equivalent) or a doctoral degree in
political science.

Methodology

A self-administered questionaire
survey of the membership of the
National Association of Schools of
Public Affairs and Administration
(NASPAA) and schools listed in the
Guide to Graduate Study in Political
Science was completed in early 1978.
Only schools with masters programs in
public administration and doctoral
degrees in political science were
included. Questionaires were mailed to
176 Master of Public Administration
(MPA) programs and 119 doctoral
programs. Eighty-one schools, or
forty-six percent of those schools
offering MPA degrees responded; and,
seventy-nine schools, or sixty-six
percent of those offering doctoral
degrees responded. (The combined
response rate was fifty-four percent.)

These two programs were selected as
indicators of other social science
programs, primarily because they tend
to be among the most quantitatively
sophisticated graduate programs in the
social sciences. (A brief look at the
core curriculum of each program will
show that the programs tend to require
their students to achieve a particular
level of statistical competency,
regardless of the statistical back-
ground of the students at the time they
enter the programs.) Furthermore, we
decided to look at MPA programs and
political science doctoral programs
separately because they have different
statistical and computing needs. More
specifically, political science
programs tend to use statistics to try
to explain political phenomena. Thus,
political science students have to cope
with what is commonly called social
statistics. Public administration
programs, on the other hand, use
statistics to help decision makers
narrow the number of viable alterna-
tives. These statistics frequently
are called management statistics.
(Moreover, the MPA degree generally is
considered a terminal degree for the
public administration profession, while
the doctoral degree is considered the
terminal degree for the political
science profession.)

The mail survey attempted to address
three areas. In the first place, it
attempted to determine the quantitative
background of students entering each
program as well as the quantitative
techniques required of most students
during their course of graduate study,
including the most commonly used pre-
written statistical packages.

Secondly, the survey tried to assess the academic departments' ratings of the computing facilities and the user services consultants available to their departments. Lastly, the questionaire attempted to follow-up on the recommendations that we made last year: to determine what social science computer users felt were the most important ways to stimulate increased communication and cooperation between user services consultants and social science faculty and students. (Rating scales were used to make such a determination.)

Analysis of data

The importance of communication and cooperation between user services consultants and social science computer users is underscored by the fact that computer usage has become an integral part of social science graduate programs. Our survey reveals that overall seventy-five percent of both the MPA and doctoral programs require quantitative techniques -- including computer usage -- as requisite to program completion. It is also worth noting that approximately eighty-eight percent of the MPA programs require such training, as compared to sixty-two percent of the doctoral programs. The lesser emphasis on quantitative techniques among doctoral programs is accounted for, at least in part, by programs in normative theory and philosophy. The difference between the MPA and doctoral program needs nevertheless are significant and may provide insight into the differences between professional and academic programs.

As Table 1 indicates, the overwhelming majority of the students entering the MPA and doctoral programs have not had many of the listed quantitative courses. The doctoral students have had more preparation in research methods but that does not necessarily mean quantitative methods. Only about one-third of all the students in both programs have been exposed to basic statistics. The evident deficiencies of the MPA and doctoral students in quantitative preparation, especially when compared with the listing of the quantitative techniques in Table 2, reveals wide gaps in knowledge that have been filled by the students' respective programs of study.

TABLE 1: STUDENTS' QUANTITATIVE PREPARATION AND BACKGROUND

	MPA		PhD	
	N	%	N	%
Research Methods	18	22	31	39
Data Processing	8	10	7	9
Basic Statistics	29	36	30	38
Calculus	5	6	5	6
Matrix Algebra	6	7	3	4
Vector Analysis	0	0	2	2
Differential Equations	1	1	1	1
Computer Programming	5	6	4	5

TABLE 2: TYPES OF QUANTITATIVE TOOLS TAUGHT

	MPA		PhD	
	N	%	N	%
Measures of Central Tendency	74	91	74	94
Measures of Dispersion	75	93	74	94
Tabular Statistics	68	84	75	95
Linear Statistics	72	89	75	95
Partial Correlation	47	58	68	87
Linear Regression	67	83	74	94
Nonlinear Regression	17	21	42	53
Factor Analysis	12	15	52	66
Nonparametric Statistics	22	27	47	60
Analysis of Variance	46	57	60	76
Analysis of Covariance	21	26	42	53
Time Series Analysis	31	38	37	47
Linear Programming	30	37	13	16
Simplex Alogrithms	15	18	6	8
Inventory Analysis	13	16	2	2
Network Analysis	18	22	5	6
Markovian decision process	9	11	11	14
Monte Carlo Methods	11	14	7	9
Queuing	23	28	7	9
Nonsimplex Algorithms	2	2	2	2
Dynamic Programming	2	2	3	4
Integer Programming	4	5	2	2
Bayesian decision models	23	28	15	19
PERT/CPM	38	47	3	4

The differences in the types and sophistication of statistical techniques taught MPA and doctoral students are shown in Table 2. The doctoral students are taught relatively more basic statistical techniques and less sophisticated decision making techniques than are the MPA students, but the MPA students are taught considerably more of the sophisticated decision making statistics. The differences are consistent with expectations concerning program orientations and portend differing demands being placed upon user consultants.

The use of more sophisticated decision making techniques by MPA students is also shown in Table 3. While both MPA and doctoral programs overwhelmingly use SPSS, the second most popular statistical package used among MPA programs is SAS, which is more oriented toward decision making

statistics. (The greater number of packaged programs available to doctoral students is probably due to both the larger school size and older age of doctoral programs.)

The available computer facilities and consulting services were usually rated good. As Table 4 indicates, most social science instructors felt that both were at least adequate. However, it is interesting to note that the instructors feel that their computing systems are much better than are their consultant services. The instructors' dissatisfaction with the consultant services is shown in Table 5.

Instructors teaching in both MPA and doctoral degree programs felt that improvements are needed in turnaround time, number of available terminals, and user services consultants' performance. Users consultants' performances were listed as a priority area.

The recommendations for increasing cooperation and communication between user consultants and social science instructors are rank-ordered by their mean scores in Table 6.

The recommendations perceived to be most useful by social science instructors were (1) hiring consultants with

TABLE 3: STATISTICAL PACKAGES USED

| | MPA | | PhD | |
	N	%	N	%
SPSS	67	83	77	98
SAS	17	21	19	24
OSIRIS	6	7	28	35
BMD/BMDP	16	20	35	44
MINITAB/OMNITAB	5	6	8	10
Veldman	1	1	2	2
Write Own	9	11	8	10
Other	14	17	15	19

TABLE 4: RATING OF COMPUTER CENTER AND CONSULTING SERVICES

| MPA | | | | |
| | Center | | Consultant | |
	N	%	N	%
Adequate	73	90	58	75
No Opinion	2	2	7	10
Inadequate	6	8	12	15

| PhD | | | | |
| | Center | | Consultant | |
	N	%	N	%
Adequate	76	96	61	77
No Opinion	0	0	1	1
Inadequate	6	8	17	22

TABLE 5: RATING OF NEEDED IMPROVEMENTS ($\bar{x}$ on 6-point scale)

| MPA | | PhD | |
Improve-ments[1]	$\bar{x}$ Ranking	Improve-ments[1]	$\bar{x}$ Ranking
2	1.82	6	2.27
1	2.42	2	2.37
6	2.60	1	2.43
4	2.86	4	2.81
5	3.03	5	3.40
3	3.48	3	3.78

[1]Suggested Improvements

1. Turnaround time

2. Terminals

3. Card reader

4. Disk space

5. Printer

6. User Consultant

social science backgrounds and (2) providing supplemental instructional material. The recommendations perceived to be least useful were (1) arranging periodic conferences between user consultants and instructors and (2) having instructors participate in user services workshops and symposia. The MPA and doctoral program instructors responded to the recommendations in much the same way, but it is worth mentioning that doctoral program instructors indicated they attached greater importance to the need for user consultants with social science backgrounds.

As shown in Table 7, MPA and doctoral instructors' responses to the recommendations to increase communication and cooperation between the user consultants and the social science student users were similar. The recommendation perceived to be the most useful by instructors in both programs was the establishment of orientation sessions to acquaint the users with the available prewritten statistical packages. The recommendation perceived to be the least useful by both was a short course in FORTRAN and COBOL.

The MPA and doctoral program instructors differ only slightly on the recommendations for the arrangement of computer center tours and the encouragement of students to seek assistance from the consultants. Political science instructors, however, were more likely to encourage their students to seek direct consultant assistance. In fact, as shown in Table 6, political science instructors even went a step further by recommending the hiring of user consultants with social science backgrounds.

TABLE 6: RECOMMENDATIONS TO INCREASE COOPERATION BETWEEN CONSULTANTS AND INSTRUCTORS ($\bar{x}$ score on 5-point scale)

MPA		PhD	
Recommendations[2]	$\bar{x}$ Ranking	Recommendations[2]	$\bar{x}$ Ranking
5	2.15	4	1.76
4	2.46	5	2.55
1	2.85	1	3.02
2	3.08	2	3.06
3	3.16	3	3.60

[2]Recommendations

1. Establish permanent lines of communication between the computer center and departments using computer facilities.

2. Set up periodic conferences between instructors and consultants with the following goals: orienting consultants to course objectives and content, orienting instructors to services available, and appraising jointly the effectiveness of pedagogical approaches.

3. Invite instructors who utilize computer facilities to participate in user services workshops and symposia.

4. Encourage the hiring of consultants with social science backgrounds when economically feasible and warranted by extensive computer use by social science students.

5. Provide instructional materials designed to supplement departmental instruction concerning data processing, with adequate provisions for differing levels of expertise among social science students (e.g., handbooks, users manuals, and audio-visual aids).

TABLE 7: RECOMMENDATIONS TO INCREASE COOPERATION BETWEEN CONSULTANTS AND STUDENTS ($\bar{x}$ score on 4-point ranking scale)

MPA		PhD	
Recommendations[3]	$\bar{x}$ Ranking	Recommendations[3]	$\bar{x}$ Ranking
2	1.90	2	1.63
1	2.32	4	2.29
4	2.41	1	2.40
3	2.96	3	3.35

[3]Recommendations

1. Arrange for computer center tours to familiarize students with computer components and facilities and with user services consultants.

2. Set up orientation sessions explaining all the pre-programmed procedures available at the computer center; these sessions should focus on, but not be limited to, those packaged programs that are used in the social sciences.

3. Present a brief introduction to FORTRAN and COBOL for students who will not be using these languages but who need some knowledge of them to converse with professional programmers.

4. Encourage students who are having difficulty operating the computer and/or understanding its operations to seek consultant assistance.

Implications

Judging from our data, it appears that the social science computer users generally were lacking in mathematical and statistical preparation when entering their respective programs. (However, some knowledge of research methods was indicated.) Because of this limited background, students tended to be intimidated by both quantitative methods and the computer itself. It is, moreover, unlikely that students will need to become adept at sophisticated data manipulation, but instead will have to know how to use the computer as a calculating mechanism. In short, these are the kinds of student-based problems that the user services consultant must both identify and deal with.

Moreover, our survey found that four prepackaged programs were used almost exclusively (SPSS, SAS, ORIRIS, and BMD). The popularity of these programs is probably related to the fact that the programs are easy to use as well as the low level of sophisticated statistics that are being taught. This low level of sophistication was noted in Table 2. It is incumbent upon the user services consultant, therefore, to become familiar with these packages.

Both the computing facilities and user services consultants, are rated rather highly. However, among the two, consultants should be aware of the fact that user services are rated lower than are the facilities. Our data show that user services are consistently rated low in terms of needed improvement and adequacy of rendered assistance. The implication here is that the consultant ought to begin improving the kinds of help that they are providing the users of packaged programs. Perhaps this

relatively low rating is due in part to the fact that consultants do not have a social science background and consequently lack empathy for the kinds of problems social science computer users encounter. This feeling is underscored by the fact that in Table 6 both MPA and doctoral program instructors felt that the computer center ought to encourage the hiring of consultants with social science backgrounds, especially when economically feasible.

With regard to software, social science instructors perceived the greatest need for improvement to be in the area of providing instructional materials designed to supplement departmental instruction concerning the use of the computer, materials such as handbooks, manuals, and audiovisual materials. The survey supports the notion that social science computer users want to restrict their involvement with the computer to the bare necessities. The idea of participating in computer center sponsored workshops and symposia, for instance, is not appealing. Perhaps, instructors perceive these kinds of activities as being too technical for their use (or beyond their competency!). By the same token, the idea of introducing students and instructors to FORTRAN and COBOL is perceived to be a waste of time. (Instructors apparently would prefer to participate in orientation sessions concerning the prewritten statistical package programs most commonly used by students and faculty.)

In conclusion, the user consultant needs to realize that there are distinct differences and needs between the graduate students in different types if similar programs -- not to mention different types of programs.