

Role of a complete Centralized Statistical Organization in a Land-Grant College

From time to time since its organization in 1933, the Statistical Laboratory of Iowa State College has received a number of letters of inquiry concerning the organization and function of a statistical center at a land-grant college or university. It has occurred to us that a typical answer to such a recent letter of inquiry from a mathematics department at a large land-grant college might be of interest to a number of our readers.

Dear Professor _____:

Thank you for your letter of _____. We have watched the recent growth and development of your statistical group and others with considerable interest, and shall be very pleased to give you an account of our experiences in organizing and developing our statistical center at Iowa State College.

I should say right away that I do not believe there is any unique optimum organization or program for a statistical center which will work equally well at all universities or even at all land-grant colleges. Further, even at the same institution, any one of several alternative arrangements might work equally well.

A complete statistical center should provide:

(i) *a research and teaching program* in statistics per se in order to develop new statistical theory and methodology and train statisticians;

(ii) *a service teaching program* to provide for basic general courses in theory and methods and specialized courses in statistics for students majoring at the undergraduate and graduate levels in some other substantive subject-matter area;

(iii) *a consulting service program*, i.e., recognized and budgeted time for various staff members of the statistical center to consult with research workers on investigations involving the use of statistical theory and methods, and

(iv) *a computing service* for the programming and analysis of data resulting from research investigations.

An organization to accomplish objective (i) might be (a) a department of statistics or, in case the group be small, (b) a subgroup of professors of statistics within some other department. In the latter case the department selected should be, I believe the Mathematics Department since it would be in a more objective position regarding applications in diverse fields.

In case a department of statistics is organized to accomplish objective (i), then objective (ii) might also be accomplished within the framework of the department, provided some teaching staff members be employed who are interested in respective fields of application as well as statistics itself.

A possible way of handling early staffing difficulties is to offer visiting professorships 1 semester or quarter to 1 year in length. Such professorships could be used to fill any major holes in the statistical teaching program resulting from staff turnover, or to meet new demands in student needs.

It would probably require very liberal mathematics department to accomplish objective (ii) within the framework of a subgroup of the mathematics department. In particular, such an arrangement might make quite difficult for a mathematics department to justify the offering of even intermediate methods courses and specialized applied courses in statistics without requiring heavy undergraduate prerequisites in mathematics. The requirement of such prerequisites in the case of many students in the biological, agricultural and social sciences would be, I believe, unrealistic at present.

Another reason for a separate department of statistics is that it can provide, more easily, an integrated rationale for teaching statistics on the campus. If applied statistics courses (e. g., courses in biostatistics, econometrics, quality control, genetic, educational, psychological, business or population statistics) are offered or wanted by other subject-matter departments, these courses can be taught by statisticians specializing in particular areas of application -- or by persons in the applied fields who are well versed in statistical theory and techniques. In either case it seems desirable that the department of statistics assume some financial and educational responsibility for the content of the courses. If the statistics department (and/or a statistical laboratory) is large enough to support fully one or more men specializing in subject-matter fields of application, then there is more direct control over the entire statistics program for the college or university. If the statistics center can support only a part-time man in the applied field, perhaps joint appointments with applied departments can be arranged.

Either of these arrangements makes for closer cooperation between the statistics department and other departments (and richer research and consultation programs) than if the other departments assume full responsibility for applied statistics

courses. These arrangements also tend to reduce duplication of course content.

It seems reasonable to assume that the people who do the hiring of new staff should be those most qualified to evaluate candidates training and experience in terms of the positions to be filled. Thus the qualifications of a statistician for primarily statistical work might be more knowledgeably accessed by other statisticians than, for example, by agronomists or pure mathematicians.

In case a statistics department is organized to accomplish objectives (i) and (ii), objective (iii) could be accomplished by assigning proportions of time of certain staff members, usually those concerned with (ii), to act directly as consultants in certain broad subject-matter areas, e.g. the plant sciences, the animal sciences, the social sciences, engineering. It would seem desirable for the most part to reserve the teachers and research workers in statistics per se as consultants to the applied statisticians.

Objective (iv) can also be accomplished within the framework of the organization of a statistics department. It should be observed, however, that objective (iii) and (iv) are not those usually associated with a university or college department. They are, rather, functions that should more properly ----. It is probably more desirable to establish a statistical laboratory or section of institutional status ----.

the head of the statistics department to be the director of the statistical laboratory or center also.

In case objectives (i) and (ii) are accomplished through a subgroup of teachers of statistics in the Mathematics Department, then it would seem desirable to organize a statistical laboratory or center with institute status to provide the consulting and computing service, i.e. to accomplish objectives (iii) and (iv). In such case the teachers of statistics in the sub-group within the mathematics department should hold joint appointments with the statistical laboratory or center.

The statistical center at Iowa State College had its beginning in 1924 when a group of interested staff from several subject-matter areas met on Saturday afternoon under the leadership of G. W. Snedecor, then in the Mathematics Department, to study statistics as a research tool. The bulletin "Correlation and machine calculation" by Henry Wallace and George W. Snedecor was published in 1925 as a result of these conferences.

In terms of our four objectives, the statistical group at Iowa State College initially was concerned with objectives (ii) and (iii) -- and principally consisted of a subgroup in the Mathematics Department. Its early work decidedly slanted toward agriculture and the biological sciences.

The demand for statistical services in processing research data increased, and in 1921 the college set up a Mathematics Statistical Service (a computing center) with Professor Snedecor in charge. Professor Snedecor was also appointed as Statistician of the Iowa Agricultural Experiment Station and two years later, as head of a newly created Statistical Section within the Agricultural Experiment Station. In 1933 the Statistical Laboratory, with institute status, was organized with Professor Snedecor as its first director. During this period of development, courses in applied and theoretical statistics continued to be taught in the Mathematics Department, an M. S. in Statistics and a Ph.D. in Mathematical Statistics being offered.

In 1947 a separate Department of Statistics was formed within the Division of Science, offering the B. S., M. S., and Ph.D. degrees in statistics. One possible advantage of this arrangement is that it permits theses of an applied and theoretical nature as well as those in theory per se. Also, intermediate or advanced methods courses in statistics, particularly those specified as service courses, may be set up with only basic required mathematical prerequisites.

Theoretical mathematical statistics courses here are double-listed, for credit at the graduate major level, with the Mathematics Department, though the instructors are full-time members of Department of Statistics.

At present the statistical center housed together at Iowa State College is administratively composed of the parts: (1) a Statistical Laboratory with institute status; (2) a Department of Statistics in the Division of Science with status equal to but entirely independent of all other departments including the Department of Mathematics; (3) a Section of the Agricultural Experiment Station; (4) a Research Field Office of the U. S. Bureau of Agricultural Economics. The Director of the Statistical Laboratory is also the Head of the Department of Statistics and the Head of the Statistics Section of the Agricultural Experiment Station. He also administers the work of the Research Field Office of the U. S. Bureau of Agricultural Economics.

A separate budget is provided by the President of Iowa State College to support the research, consulting, and computational work of the Statistical Laboratory. Separate budgets are also provided for the Department of Statistics by the Dean of the Division of Science, and for the Statistics Section by the Director of the Agricultural Experiment Station. All three budgets support graduate assistantships and associateships. The Station also supports the training of a limited number of students specifically as statistical consultants. The work for the U. S. Bureau of Agricultural Economics is

arranged on a contractual year-to-year basis.

In addition to the financial support described above, the statistical center at Iowa State College engages in contractual research, consulting, computational projects for state and federal governmental agencies, private foundations, commercial and industrial concerns, and other educational institutions. The amount of such work varies from year to year, but may involve as much as \$100,000 or more during some years. This work is arranged by contract jointly through the Statistical Laboratory and the Division of Science Research Institute of the Division of Science, or through the Statistical Laboratory and the Iowa Agricultural Experiment Station.

Due to yearly fluctuations in the contractual work, it is not possible to state an overall yearly amount available to our statistical center.

Measure of the relative emphasis on different aspects of our teaching program in statistics might be indicated by the following figures for 1951-1952: 3 Ph.D., 6 M. S. and 9 B. S. degrees granted with major in statistics; 22 students receiving Ph.D. degrees with some other substantive area but with minor in statistics. In 1952-1953 there were 2 Ph.D., 9 M.S. and 8 B. S. degrees granted with major in statistics.

A rough measure of the relative emphasis on consulting and research might be indicated by nine joint research publications between statistical consultants and other subject-matter specialists and ten publications in statistics per se for the 1951-1952 period.

The computing service provided by our statistical center is supported by intramural charges at actual cost. This cost does not include the cost of the services of a Supervisor of the Computing Section or the services of a numerical analyst. The latter holds a joint appointment with the Mathematics Department. The half-time in Mathematics is assigned to teaching courses in numerical analysis while that in the Statistical Laboratory is assigned to research and consulting in numerical analyses and computational methodology.

At present there are two other staff members who hold joint appointments with statistics: one statistics-economics and the other statistics-psychology.

In summary I believe that a Statistical Center should basically be comprised of: (i) a teaching unit, which may be either a separate statistics department or a sub-group of a very liberal mathematics department; (ii) a statistical laboratory or institute to provide research in methodology and give campus-wide consulting and computing service.

Finally, should the size of the group in statistics permit, it is my personal opinion that a separate department of statistics is desirable.

Sincerely yours,
T. A. Bancroft
Director

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