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ABSTRACT

An exploratory study into the bias associated with faculty self-reporting of time and effort is reported. The paper delves into the question of whether or not there is bias in faculty reports of time and effort and whether a pattern to any such bias might appear. The methodology for conducting the study involved gathering faculty estimates of time/effort using both questionnaire and diary instruments. A method for determining and quantifying bias was established and used in gathering data. Based upon the results of statistical treatments applied to the data, some observations and conclusions were made concerning the presence of bias in faculty time/effort reports. It was concluded that a diary is superior to a questionnaire for self-reporting of time/effort because no reliance need be placed on memory or on an individual's ability to estimate average time expenditure. (Author/KM)

Title: A Study to Determine the Bias in Faculty Reports of Time and Effort Expenditure

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## Summary

This paper is the report of an exploratory study into the bias associated with faculty self-reporting of time and effort. The paper delves into the question of whether or not there is bias in faculty reports of time and effort and whether there is a pattern to any such bias which might appear.

The methodology for conducting the study involved gathering faculty estimates of time/effort using both questionnaire and diary instruments. A method for determining and quantifying bias was established and used in gathering data. Based upon the results of statistical treatments applied to the data some interesting observations and conclusions were made concerning the presence of bias in faculty time/effort reports.

# A STUDY ON BIAS IN FACULTY REPORTS OF TIME AND EFFORT EXPENDITURE

Patrick H. Sullivan, D.B.A.

This paper is a report on an exploratory study into the bias associated with faculty self-reporting of time and effort. The paper delves into the question of whether or not there is bias in faculty reports of time and effort and whether there is a pattern to any such bias that might appear.

## Background

In order to put this report into perspective, let us review the circumstances which led to its preparation. In January, 1971, this writer was directed to determine how faculty members at the Florida State University divide their time among specified categories of academic activity. The purpose of the project was twofold: First, it was to provide information for impending legislative hearings and second, it was needed to produce baseline information for the up-coming program budget and six-year plan.

A brief review of literature in the educational field revealed that although there were many studies on faculty time and effort, no substantive studies had been performed on the subject of survey methods for faculty time/effort reporting. With the absence of such research,

an attempt was made to determine how other universities were obtaining information on faculty effort distribution. Letters were sent to the directors of institutional research of the forty United States universities larger than Florida State University, those forty offering the largest number of doctoral degrees in academic year 1969-70.[1]

These letters asked for information on how each university went about obtaining information on its faculty's division of effort. Of the forty schools polled, thirty replied. Of that number, 16 required a faculty questionnaire, 5 obtained the information from department chairmen, and 9 made no attempt to obtain the information.

The results of the poll indicated that a mail questionnaire was the common method of obtaining faculty time/effort information. In all cases the faculty members were given selected information as to the reasons for the questionnaire. Typically, this information suggested such reasons as Federal reporting requirements, budgetary studies, resource analyses, building a data base, or providing information for committees on promotion and tenure.

In each instance, questionnaires were distributed, completed by respondents, and then returned either directly to the central office or via the department chairmen or deans. In no case did the university reveal that any attempt had been made to determine whether or not respondents were

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[1]Lloyd A. Garrison, "Preparation of Junior College Instructors," Junior College Journal, XII (November, 1941), 135-41.

biased in their reporting of effort. Responses were collected and tabulated without challenge or modification by the university.

The results of this poll of universities led to a decision to utilize a questionnaire instrument to determine how the faculty at the Florida State University divided its effort among selected activities. This writer then constructed an instrument that requested faculty information required by the university. This instrument utilized the best concepts and approaches of each questionnaire received from the other universities. The resulting questionnaire was distributed directly to each faculty member having a half-time or greater appointment.

The writer then conducted faculty briefings and institutional meetings campus-wide on how to complete the questionnaire. The reaction to the questionnaire itself, the faculty concepts of the reasons for it, their apprehensions about the uses or the misuses of the data, and their view of the process as a threat impinging upon academic freedom were revealed as real forces at work among the faculty. These factors were seen to be significant and unavoidable forces impinging upon the reporting process.

Given these attitudes of fear and apprehension on the part of many faculty members, this researcher began to doubt whether it is possible to obtain accurate and unbiased information on faculty activities through use of a questionnaire instrument. In other words, it was felt that it

would not be possible to accurately measure output of the faculty resource.

Contributing thoughts

In a paper presented to the American Council on Education's 1959 Conference on Faculty Workload, Dr. Theodore Caplow recognized that there are an infinite number of ways to measure faculty load, but all of these pose problems. The first problem, he felt, is that there will be cheating when faculty load is measured by an administrative office. That this is so is not disreputable. It is a matter of general observation that whenever worker output is measured by employers there is some misrepresentation unless extreme (and in this case, Caplow felt, inappropriate) care is taken to verify the figures.[2]

In commenting on the deviltries of faculty load studies, Reeves and Russell made the following comment that provides an excellent summation of the situation.

> The evaluation of faculty load is an extremely difficult problem. Teaching duties and other professional duties vary tremendously from institution to institution and individual to individual within the given institution. In fact, the factors involved in determining total faculty load are so numerous and so varied as almost to preclude precise determination by any mechanical method. No thoroughly scientific method of measuring faculty load is now available. Existing measures are unsatisfactory and incomplete. The answers are not yet in. Yet,

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[2]Theodore Caplow, "The Dynamics of Faculty Load Studies," in Faculty Work Load, ed. by Kevin Bunnell (Washington, D.C.: American Council on Education, 1960), p. 69.

> as a practical necessity, some method of measuring and adjusting faculty load--even though approximate--must be employed.[3]

While measurement of faculty output has been a consistent and continual problem in higher education for a number of years, there are no significant difficulties with measuring the output of processes which are easily quantified. Assembly lines producing automobile parts, electric components, 6-packs of Coca Cola, or cartons of cigarettes present no conceptual measurement challenges. Engineers have been ingenious in devising methods of measuring, weighing, and otherwise assigning numerical values to the outputs of such operational processes.

On the other hand, wherever an output or operational result involves the human resource, measurement becomes more challenging. The Hawthorne experiments gave evidence of this phenomenon. Under varying operating conditions worker output increased regardless of the changing physical environments devised by the experimenters. It was determined that the presence of outsiders (the experimenters) was itself affecting the performance of the workers. Studies since then have determined that either the presence of observers or the knowledge that performance is being measured may have an impact on the amount and type of action taken by the person being measured.

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[3]F. W. Reeves and J. D. Russell, "Instructional Loads," College Organization and Administration (Indianapolis, Ind.: Board of Education, Disciples of Christ, 1929), pp. 165-82.

Hypotheses

In developing the methodology to attack the problem of examining whether (and to what degree) there is bias in reporting time/effort through the use of questionnaires, the following questions (hypotheses) were proposed:

1. Is there any significant bias in reporting faculty time/effort on questionnaires?
2. Is there any significant difference in reporting bias between academic ranks?
3. Is there any significant difference in reporting bias between academic disciplines?

Methodology

With no existing studies to use as a baseline or point of departure, the research techniques described herein are exploratory in nature. That is, they attempt to determine the presence and pattern of occurrence of any bias in reporting on self-completion type questionnaires.

An ideal approach to this kind of problem of determining bias would be to compare measured responses to known values. Since the known values did not exist, other procedures were needed.

As an alternate methodology to the above, the following was decided to be a satisfactory substitute. Truer values than those available through the questionnaire were used in place of the absolute known values. These truer

values were obtained through use of another measuring instrument more accurate than the questionnaire.

A careful review of the literature revealed that a diary instrument, when used under carefully controlled circumstances, will provide more accurate information on time/effort than will a questionnaire.

It was therefore decided that the test instrument to be used to provide an alternate source of information on faculty time/effort would be a diary log sheet. Faculty estimates of time/effort were gathered using both questionnaire and diary instruments. For selected activities, the algebraic difference between questionnaire and diary estimates was obtained. This difference represented a measure of the bias in the questionnaire responses.

Bias, a term used throughout this paper, is a synonym for noise, anomaly, delay, or difference. The word "bias" carries with it no connotation of either goodness or badness. It has no connection with statistical bias. It is the difference between the real amount of time/effort devoted to certain activities and the apparent amount of time/effort devoted to those activities as reported through the information channel.

Thus, the algebraic difference between a sample respondent's diary results and the questionnaire's reported norm for that cell represented the difference between the individual's actual activity and the estimated activity for individuals of that cell. The assumption was made that this

difference represented a measure of bias and not the bias itself. Due to a lack of any previous developed technique for determining bias, this researcher felt justified in using the above measure. Further, it was hoped that the exploratory nature of this research provided sufficient license for experimentation.

In view of the foregoing a sample of faculty diaries was obtained in such a way that it could be used for two types of tests: First, to determine whether the diary data were significantly different from the questionnaire data, and second, to determine if it might be possible to detect significant differences in bias between academic ranks or academic disciplines.

As for the activities to be measured, the original questionnaire contained a number of candidates. Selecting the particular values to be studied from this list of candidates required the development of a set of selection criteria.

A first consideration was that the value (or parameter) should be clearly defined and not easily misunderstood. A second criterion for selection of parameters was that they should be common to all faculty.

In order to meet the criteria of being easily understood and easily quantified, activities were defined in such a way as to be consistent with the faculty's perception of the task. Measuring activities in the category "academic support" would not be desirable since this

represents a set of activities grouped for budgetary convenience and not a set of tasks performed by a faculty member. Therefore, a professor might not find it easy to perceive, and hence be unable to correctly quantify his "academic support" activities.

It was therefore decided to measure instructional activities using both the questionnaire and the diary. The activities measured and compared were: classroom teaching activities, individual instruction activities, and academic advising.

Forty-eight faculty members were selected using random procedures within twelve pre-selected strata. These strata or cells were arranged to include faculty from all instructional departments. These departments were divided into four academic discipline groupings:

1. Professional Schools
2. Social Sciences
3. Physical and Quantitative Sciences
4. Arts and Letters

Within each discipline grouping four faculty of each rank were selected. An application of statistical processes to the data gathered from these people allowed for the exploration of bias and its differences between ranks and between disciplines.

For each of the forty-eight faculty members participating in the study, diary data were obtained for no

less than fourteen days during the Spring Quarter of academic year 1970-71. For each respondent seven sample days were obtained during the first five weeks of the quarter and seven more sample days from the last five weeks. Each of the two seven-day periods or sample weeks for a respondent contained one Sunday, one Monday, etc., such that each day of the week was represented.

As each diary sheet was received back from a participant, it was checked and the data placed onto computer cards. When all diaries were returned and the data punched, the statistical comparisons began. The average number of hours per week expended in each category as reported on the diary was algebraically compared with the similar values reported on the questionnaire. The differences between the two, called bias here, were subsequently operated upon statistically.

## Findings

The first question to be answered by this research was whether there was any statistically significant bias present. A simple Student's "t" test was used to make this determination. The results of this test showed bias to be present in all three categories of instructional activity. In all cases the questionnaire estimates exceeded the diary tabulations, thus indicating an upward bias in the estimation of time expenditure on the questionnaire.

In order to respond to the questions or hypotheses concerning the detection of differences in bias between ranks or disciplines, a two-way blocking design analysis of variance (ANOVA) model was used. In this model individual bias were considered to be the experimental units, academic disciplines were the blocks, and academic ranks represented the treatments. This procedure yielded a four block by three treatment (or twelve cell) segmentation of the population.

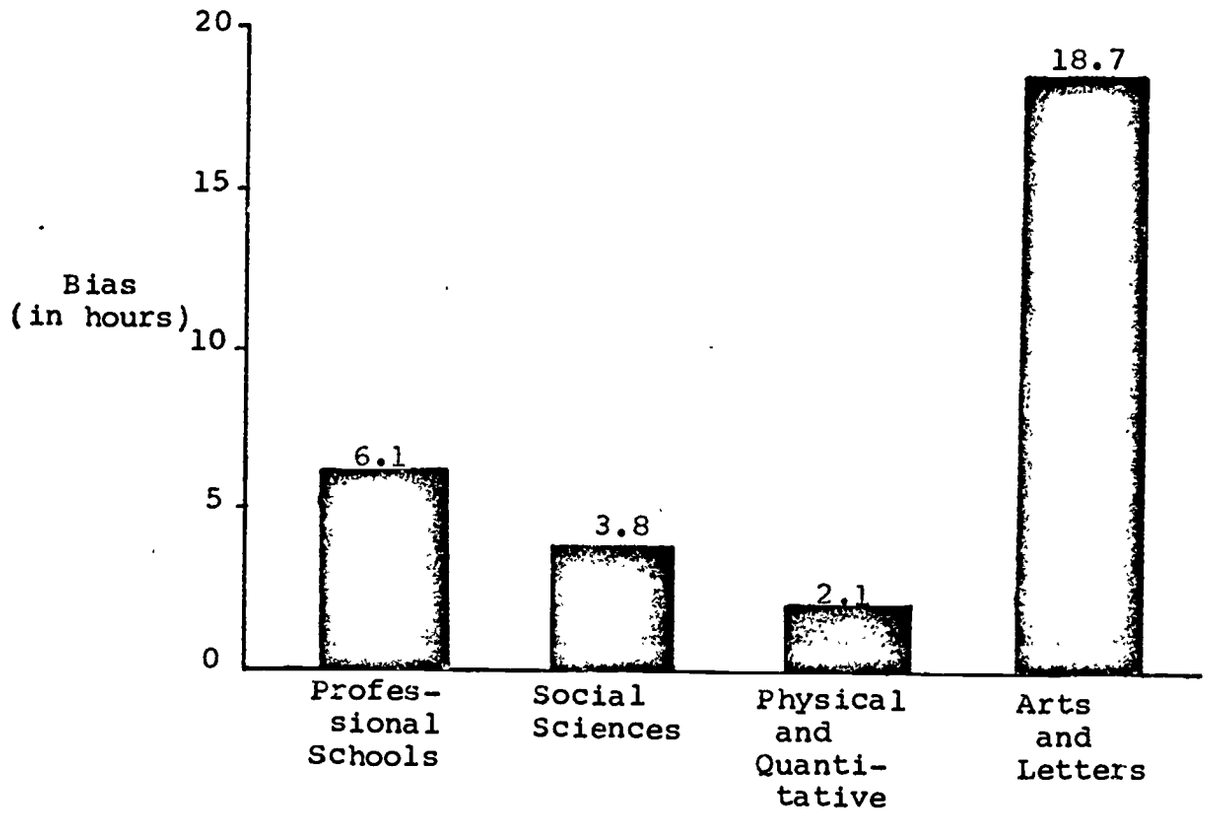
Use of this model revealed no differences in bias between the three academic ranks of professor, associate professor, and assistant professor for any of the three categories of activity. That is to say, that although bias factors existed for each rank, there were no statistically significant differences in bias between ranks.

When testing for differences between disciplines, however, there were statistically significant differences found in the activity category called classroom instruction. The levels of bias were as shown in Figure 1.

## Conclusions

The findings of this research lead one inexorably to certain conclusions. The first of these is that where a questionnaire instrument is used to obtain self-reported estimates of time and effort expenditure, there is a distinct possibility that bias will be found in the responses.

Fig. 1.--Comparisons of Levels of Bias




The second conclusion is that wherever accurate estimates of time/effort are needed through self-reporting instruments, a diary should be used in lieu of a questionnaire. The results of this study demonstrate the virtues of the diary where accuracy of data is a prime consideration. Diaries require respondents to write down their activities as they occur. No reliance need be placed upon memory or upon one's ability to estimate average time expenditure. Thus, a diary is an ex post documentation of events that have occurred, while a questionnaire typically requests estimates of past, present, or future events.

The third conclusion concerns the existence of bias among groups of respondents. This study has shown that people differ in their tendency to bias questionnaire responses. These differences occur with both individuals and groups. The differences between individual biases were expected, whereas the differences in group bias were not. The large differences between the bias reported by Arts and Letters discipline and the other three disciplines is ample evidence that groups of respondents can collectively, and without apparent collusion, bias questionnaire inputs in the same direction and to the same degree.

A fourth conclusion may be drawn concerning the composition of bias. Bias, as used in this research, is the algebraic difference between diary values and questionnaire values. Given this mathematical definition, one must carefully question the factors that make up the bias. The existence of both accurate and inaccurate estimates of time expenditure on the questionnaire lead one to believe that there are two major components to bias. The first of these is the ability, or inability, of the individual to estimate time expenditure. The second component, independent of one's estimating ability, concerns the existence of a conscious effort to alter these estimates once they have been made.

## Implications

This study should be of interest to administrators and managers who contemplate the use of self-completion

instruments to obtain time/effort expenditure data from employees. Although it is clear that bias can exist in data obtained through questionnaires, it should be equally clear that it can occur on diaries or any other self-reporting instrument. The nature of the diary technique is such, however, that it takes a more deliberate and consistent effort on the part of a respondent to bias a series of diaries. Thus, although one cannot expect to find bias completely absent in diary-produced data, one can expect to find its presence minimized.

Administrators should also be aware of the trade-off between the need for accurate information and the cost of obtaining it. A carefully controlled diary census of all faculty would provide the most reliable estimate of faculty activity that is possible using self-completion devices.

This procedure is quite costly to carry out. The costs associated with planning for such a project; printing costs for thousands of diary sheets, the expense of envelopes for mailing, the cost of mailing (either in postage or increased work force for campus mail), the personnel needed for processing completed diaries and tracking down missing diaries, and finally, the computer costs for tabulation and analysis; sum up to a large dollar amount.

At some small sacrifice in accuracy but at considerable saving in dollar expenditures, one might conduct a diary study involving a carefully selected sample of faculty, rather than a census of faculty. At even less

cost and with lesser precision of results, one might consider using a questionnaire census (or sample) of faculty.

The researcher believes that for most applications it is neither necessary nor desirable to incur the costs associated with obtaining precise estimates of employee time/effort expenditure. If one is willing to accept the bias likely to occur in questionnaire-gathered estimates of time/effort expenditure, then the precision versus cost decision should be an easy one to make. Quite simply, with decreasing requirements for accuracy, concomitant cost reductions can be realized.

In closing I would like to share with you the thoughts of a pioneer in the field of institutional research, Hugh Stickler. The following comment from his 1959 classic paper on faculty load studies provides an excellent summary for this paper:

> From the various studies to which reference has been made in this paper . . . 'total workload cannot simply be described or easily measured. Literature to date is confusing, fragmentary, and inadequate. Findings are frequently conflicting and/or inconclusive. Relatively little real progress has been made in developing adequate techniques for the measurement of total faculty loads'. . . . That was the attitude when Reeves and Russell described it in 1929; it is still the situation thirty years later in 1959.[4]

And what of 1973?

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[4] W. Hugh Stickler, "Working Material and Bibliography on Faculty Load," in Faculty Work Load, ed. by Kevin Bunnell, p. 84 citing M. E. Haggerty, The Evaluation of Higher Institutions (Chicago, Ill.: University of Chicago Press, 1937), pp. 144-56.

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