THE PRODUCTIVITY OF UNIVERSITY EDUCATORS

by

DANIEL JOHN BROWN

B.Sc., University of British Columbia, 1963

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS IN EDUCATION

in the Department

of

EDUCATIONAL ADMINISTRATION

We accept this thesis as
conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

August, 1968

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and Study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Educational Administration

The University of British Columbia
Vancouver 8, Canada

Date Sept. 7, 1968

ABSTRACT

This survey investigates some of the social determinants of educational productivity. A theory with its basis in the sociology of small groups is presented in an attempt to explain how leader behavior and colleagueal relations in a university department might affect the productivity of professors. A sample of university social scientists was selected and variations of Halpin's LBDQ and OCDQ along with a quantitative assessment of productivity were administered by interview. The data were subjected to regression analysis and 39% of the productivity variance was found accountable to the predictors.

The variables of aloofness (a leader's bureaucratic behavior), consideration (the leader's tendency to treat his staff "humanly"), thrust (the leader's tendency to set an example), hindrance (group feeling that they are required to do "busywork"), intimacy (the social dimension), and production emphasis (the leader's behavior which is focused on production), the number of student assistants, and the orientation towards teaching emerged as significant predictor's of productivity. Other predictors, such as research orientation, travel fund availability, degree, degree date, rank, approximate age, morale, stimulation, initiating structure and publication emphasis were not significant but in the predicted

direction.

Five exploratory analyses were conducted. The results accounted for less productivity variance but tended to support the above findings.

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

My most sincere thanks are due to those who were instrumental in bringing this study to fruition. These include the members of my thesis committee, Dr. Lawrence W. Downey, as chairman, Dr. Harold J. Dyck, and Dr. Braxton M. Alfred. Dr. Downey provided the initial impetus for the study, the aid that made the study possible, and invaluable guidance as the survey progressed. Dr. Dyck provided considerable guidance and encouragement throughout the latter stages of this work. Dr. Alfred served as a frequent advisor on research methods and also played a most supportive role.

Additional acknowledgements are due to Harold Leibel and Brian Cudworth, fellow students in educational administration, who adapted the Halpin instruments to a university setting. Finally, many thanks are due to my wife, Marnie, a constant source of encouragement and aid throughout the many endeavours associated with this thesis.

CHAPTER I

INTRODUCTION

The study of organizational sociology presents many questions regarding the interactions of individuals in a modern bureaucracy. One who proposes to investigate this area of human affairs must have a strong belief in the potency of the social determinants of human behavior as compared with determinants which are physical, biological, or psychological. This study proposes to investigate, in both a theoretical and a practical vein, some of the behaviors of professionals in university organizations. The key concept in this survey is that of educational productivity as applied to university professors. Their productivity may be considered to be their professional contributions such as their writings and research, and their organizational contributions such as their teaching and administrative endeavours. The central questions of this investigation are these: do some of the variables which operate in an organization, for instance, those relating to leadership behaviors and group work relations, have an influence on educational productivity? From the practical and prescriptive point of view of the study of educational administration, what can a department head do to facilitate greater

productivity on the part of his subordinates? Other questions immediately arise. Is the large degree of individual autonomy and the looseness of the university departmental structure sufficient to minimize any effect of leadership and work relations variables minimal when compared to factors such as economic considerations or a person's own orientation? This thesis is an attempt to begin to answer some of these intricate problems relating to educational productivity.

The question of the social determinants of group productivity is implicit in most of the writings on administration. Since the advent of the "Human Relations School" great stress has been placed upon the importance of the sociological factors which are believed to profoundly influence human productivity. This present study attempts to investigate one small aspect of this problem-- the results of the efforts of a university group. Groups of researchers are normally to be found at universities, research institutes, and in the laboratories of governments and commercial enterprises. As these groups fit into their respective organizational structures, they are administered by a leader who serves to coordinate and direct group efforts. This particular group situation is characterized by a strongly professional attitude of its membership. The members consider themselves to be autonomous in that they as individuals exercise considerable discretion over their work. They tend to be status-striving such that they endeavour to achieve

professional recognition and promotion through their work. Also, these personnel tend to be work-oriented--they are highly dedicated to their research and its related scholarly activities.

One may ask questions on the problem of educational productivity from either of two major points of view. Either one can take a theoretical stance and ask,"what factors in an organizational setting affect an individual's productivity?" or one can ask,"what can an administrator do to foster productivity in the personnel subordinate to him?" The first aspect is concerned with theory building and asks for explanations. The second is concerned with prediction and the practical problems of 'running' an educational organization. The first is concerned with the quality of explanation while the second is concerned with the selection of factors for prediction.

This study adopts the joint goals of both the above approaches to research. In a section devoted to theory construction, it will state (as explicitly as possible), the rationale used to derive the hypotheses which are later tested. In a section on methodology, it will discuss the methodological steps and problems which are of interest to both theoretical and predictive research. The section devoted to analysis will discuss the results as found in relation to the theory. The final section will then summarize the planned results, some exploratory results, and will offer a commentary on the theoretical implications of the study,

possible future research, and some ramifications for the educational administrator.

CHAPTER II

THEORY

The theory in this thesis has been given the format of an axiomatic theory similar to that proposed by Zetterberg (1965a). This mode of explanation was chosen because its assumptions are made explicitly, it requires a definition for each concept used, and its logic is clearly expressed; in short, it attempts to be rigorous. It is seen that the function of a theory is to provide a basis for the generation of hypotheses may then be tested empirically to give evidence for or cast doubt upon the explanations from which they were deduced.

The theory developed below concerns itself with the explanation as to why certain predictors (the leadership style and work relation variables) might affect productivity. The antecedent conditions stated limit the scope of the theory to groups which are very similar to research groups. The axioms (or assumptions) which are given are statements which are frequently utilized in the explanations which follow. The explanations themselves are actually theories in miniature—they begin with a predictor and lead through a chain of cause and effect until they arrive at productivity. Assuming that the logic is sound, the axioms and antecedent conditions are

correct, and that transitivity holds, from each of the explanations offered may be deduced a hypothesis relating the predictor to the dependent variable of productivity.

The following are seven antecedent conditions which establish the boundaries of applicability of the theories to be presented. It is understood that the theories are not intended to apply to group situations under which the seven conditions are not met.

CONDITIONS

Condition C1

The following axioms apply to a small group.

Definition: a small group is defined as a small aggregate of people between the members of three and twenty, who interact with face-to-face contact.

Condition C2

The assumptions apply to the members of a small group.

Definition: group members are persons, the elements of a group.

Condition C3

The group is task-oriented.

Definition: a task-oriented group is defined as a group whose primary reason for existence is the accomplishment of tasks.

Condition C4

The group has a formal leader.

Definition: a formal leader is a group leader who is appointed and has the formal recognition as being the group leader.

Condition C5

A norm which prescribes individual autonomy is present.

Definition: autonomy is defined as a set of beliefs which infer that an individual should retain a large measure of control over the direction, intensity, content, and time of his work.

The presence of this norm has been well documented as a result of surveys of many research and professional organizations. Scott (1965) reports that in a social welfare agency investigated, those who were professionally inclined were more demanding of autonomy. Hagstrom (1964), in a discussion of scientific teamwork, indicates that the autonomy norm is very strong--one response from an interview was: "Telling someone what to do is taboo." Investigating the scientist-supervisor relationship, Glaser (1963) states:

> "Recognized competence in research of both parties is shown to be a source of mutual attraction, reciprocity in work and maintenance of autonomy".

This comment emanated from the empirical study of a large government research organization. Kornhauser and Hagstrom (1962) clearly indicate that the results of many previous studies show that scientists place a high value on freedom of research. A survey of university scientists by West (1960) suggests that they will tolerate only minimal restrictions on their freedom. Baumgartel (1957), on

investigating the leadership styles of research administrators, found that joint decision making with the subordinates contributed to greater motivation and more positive attitudes toward the organization. In an earlier study of a naval research laboratory, Shepherd and Brown (1956) also found the scientists' stress for independence. Pelz (1956), in his initial studies on performance on research organizations, indicates that productivity was higher when autonomy of action was granted.

Condition C6

A norm which endorses status-striving behavior is present.

Definition: status-striving is the behavior on the part of individuals to attempt to gain upward mobility by promotion or through recognition by their contemporaries within their profession.

Status-striving became apparent when a number of research organizations were studied. Pelz and Andrews (1966), from a survey of 1,311 scientists in eleven different laboratories, found that both status-striving for organizational promotion and status-striving for professional recognition were both present. Marcson (1960), using a case study approach, found that involvement, self-realization, and status recognition (from the group as well as from the profession) are what he calls the "professional needs of the scientist". The study of a university social research group by Bennis (1956) underlines the norm of status-striving as being a potent moti-

vator for research.

Condition C7

A norm which stresses devotion to work is present.

Definition: devotion to work is behavior on the part of individuals which is characterized by intense interest, concentration, effort and time directed towards their work.

Pelz and Andrews (1966), in their major study, indicate that scientists are involved with their work, university scientists being more involved than those in government institutions. Shepherd and Brown (1956), found that there was a high emphasis on science in the research laboratory which was studied. Bennis (1956), in his study on research groups, states that this same strong work norm operates.

The conditions which describe a university research department have now been stated and an attempt has been made to substantiate them. The following are four axioms which will be used frequently in the explanations or theories. The approach used here is an application of the sociology of small groups.

AXIOMS

Axiom A1

The greater the power of a norm, the greater the conformity of behavior of group members to that norm, and, the less the power of a norm, the less the conformity of behavior of group members to that norm.

Definition: a norm is a rule for member behavior which is

shared by the group and which arises from a person's values and the circumstances of behavior.

Definition: the power of a norm is defined as the extent to which a group will tend to impose sanctions upon a member who violates or conforms to the norm.

Definition: conformity is any action or limitation of action in accordance with a given rule. (The opposite of conformity is violation).

With reference to the power of a norm, greater power means greater severity of punishments in the form of ostracism, for instance, as a result of normative violation, or, greater reward or reinforcement for a high level of conforming behavior. For example, a group may bring pressure to bear on an individual who exceeds the agreed rate of group productivity. This may be done by simply registering disapproval, by interfering with the deviate's work, by threating the wayward member, or by any of a number of other means. On the other hand, should a member be perceived as being extremely helpful in the work situation, he tends to be rewarded with return favours, group friendship, ensured status as a group member, and/or other positive reinforcements for his action. However, it is seen that the extent to which he is sanctioned (either positively or negatively) will depend on the relative strength and importance of the norm in question as perceived by his fellow group members, as well as the extent to which he conforms to deviates from the norm. A positive example of the foregoing would be a group member

who is polite to his fellows when a "politeness norm" holds. He will be rewarded (though mildly) with politeness in return. Should he save the group from dissolution by outside influence under circumstances where all members are agreed that the safety or intactness of the group is a primary concern, then group members will tend to reward his action highly. A negative example might be the violation of a "promptness norm". Members may express their disapproval or begin activities without the deviate, but he receives no major punishment. Should he violate an "incest norm" or be guilty of grossly non-professional behavior, about which there are strong feelings, then he may be excluded from the group or in the most extreme cases, the group may terminate his life. It is suggested , then, that the stronger these sanctions, the more likely individual members will conform to them. In the case of the research group, where members have emerged from a lengthly training and selection process, and where membership in the group is valued, that group member behavior will conform largely to the powerful norms, and, with respect to the lesser norms, much greater deviance will be tolerated. In other words, a very weak norm of physical fitness would elicit very little conforming behavior and virtually no negative sanctions in its violation.

Axiom A2

The greater the number or intensity of violations of norms on the part of a person, the less the group-directed communication to him over time.

Definition: communication is defined as the exchange of information and the transmission of meaning.

Definition: group-directed communication is that communication which is initiated by any member of a group and is directed towards a given individual.

This axiom concerns itself with one type of negative sanction--that of communication reduction to the deviate. It is acknowledged that other forms of negative sanction may well take place, but in the context of a professional research group it is suggested that in the case of the possible other sanctions there exist norms which would prohibit their use. An experiment by Schacter (1951) showed that group members who disagreed with a deviate's opinion tended to stop communicating to him towards the end of the discussion, demonstrating that they were redefining the psychological group and excluding the deviate, who was violating a predefined consensus norm. Evidence for the above assertion may be also taken from the results of a study by Festinger and Thibaut (1951), wherein the communication towards the holders of extreme opinions diminished as time progressed. Once again, the psychological group was redefined to the exclusion of the deviate.

Axiom A3

The greater the number and duration of communications, the greater the stimulation, and, the less the number and duration of communications, the less the stimulation.

Definition: stimulation is the rate of reception of: ideas

of common interest, assistance, and encouragements of one person from another.

This axiom presupposes very strongly that the group is a research group and that the conditions stated above are applicable. Support for this assumption may be taken from Pelz and Andrews (1966) who state that communication within research laboratories greatly promoted the stimulation of scientists to produce. Marcson (1960) suggests that one of the needs of a scientists in involvement with others in order to produce the stimulation needed. Bush and Hatlery (1956), in discussing studies on scientific research, highly recommend teamwork and communication as a means of stimulating scientists. In an empirical study on medical researchers, Pelz (1956) states:

> "Results indicate that scientists tend to perform more acceptably when they are closely associated with colleagues having a variety of values, experiences, and disciplines, and when supervisors provide frequent stimulation combined with autonomy of action."

Frequent contact between scientists is seen as a source of stimulation. It seems reasonable to suggest that a scientist working largely alone would tend to communicate less with his fellows and thus the influx of new ideas and encouragements to him would be reduced.

<u>Axiom A4</u>

The greater the stimulation, the greater the productivity, and, the less the stimulation, the less the productivity.

<u>Definition</u>: a person's productivity is defined as his number of work units produced per unit of time.

<u>Definition</u>: group productivity is the sum of individual productivities.

The articles quoted in support of axiom A3 are largely applicable to this assumption as well. Pelz and Andrews (1966) explain that colleagues enhance performance by stimulation through contact. Crane (1965), in a study of university size and scholarly productivity, suggests that both greater productivity and greater recognition of students from major universities resulted from the contacts that these students had with eminent scientists in their respective fields-- contacts, that is, for both stimulation and future job opportunities. Pelz (1956), in the above quotation, makes the point about frequent stimulation leading to more acceptable performance. Considering the evidence presented here, it seems reasonable to suggest that an individual who is not stimulated for any reason, be it lack of communication, an unwillingness to discuss his work with colleagues, or a lack of adequate self-expression, for example, will tend to have his research productivity limited to written materials and his own resources.

The four axioms which are applicable to this study have now been stated, and an attempt has been made to substantiate them. The theories or explanations are now discussed. Each of the ten explanations begins with a predictor variable and ends with the dependent variable of productivity. The hypotheses generated by the explanations consist simply of each predictor variable with its individual effect on

productivity.

EXPLANATIONS AND HYPOTHESES

Explanation E1

The greater the initiating structure on the part of a leader, the greater the group productivity.

Definition: initiating structure, as defined by Halpin (1966), refers to "the leader's behavior in delineating the relationship between himself and members of the work-group, and in endeavoring to establish well-defined patterns of organization, channels of communication, and methods of procedure".

In a group in which a devotion-to-work prescription (condition C7) is present, this type of leader behavior will serve to expedite the work of subordinates. As a result of this behavior, the leader tends to reinforce the group work norm. As this norm is strengthened, so will productivity increase, by axiom A1, wherein group members conform to strong norms.

Explanation E2

The greater a leader's consideration, the greater the group productivity.

Definition: Halpin (1966) defines consideration as "behavior indicative of friendship, mutual trust, respect, and warmth in the relationship between the leader and the members of his staff."

Consideration, as defined, implies that the group will

have friendly social relations with its leader. This kind of social relation in turn implies that there will be a higher level of communication between leader and group. Greater communication results in greater stimulation of group members by axiom A3 and conditions C6 and C7 (the status-striving and work norms). By the same conditions and axiom A4, the greater stimulation results in greater group productivity. Hereafter, this consideration will be called consideration II.

Explanation E3

The greater the group disengagement, the less the productivity.

Definition: disengagement is defined by Halpin (1966) as "the teachers' tendency to be "not with it". This dimension describes a group which is "going through the motions," a group that is "not in gear" with respect to the task at hand. It corresponds to the more general concept of anomie as first described by Durkheim. In short, this subtest focuses upon the teachers' behavior in a task-oriented situation."

A discussion involving disengagement and its effect on research group productivity presumes a situation out of context from that assumed by the status-striving and work prescriptions. Should the group be disengaged, and should these norms not be operating, then their lack of strength implies a reduction in productivity by axiom A1. The group which is disengaged does not come under the rubric of a research group as proposed by this thesis.

Explanation E4

The greater the group hindrance, the less the group's productivity.

Definition: Halpin (1966) defines hindrance as "the teachers' feeling that the principal burdens them with routine duties, committee demands, and other requirements which the teachers construe as unnecessary "busywork". The teachers perceive that the principal is hindering rather than facilitating their work."

If group members feel that their leader is burdening them with petty duties and is hindering their work, they will perceive the leader to be violating both the autonomy and work norms (conditions C5 and C7). This violating of norms results in reduced group-to-leader communication by axiom A2. The reduction in group-to-leader communication effects less stimulation on the part of group members by axiom A3 and the conditions of status-striving and work-orientation (condition C6 and C7). With these same conditions and axiom A4, the reduction in stimulation results in a reduction in productivity.

Explanation E5

The greater the group intimacy, the greater the group productivity.

Definition: intimacy is defined by Halpin (1966) as "the teachers' enjoyment of friendly social relations with each other."

Intimacy, as defined, is the extent of friendly group

social relations and the greater the group intimacy, the greater the amount of intra-group communication. The greater this communication, the greater is the stimulation of group members by axiom A3 and with the antecedent conditions of status-striving and work, C6 and C7. This greater stimulation results in greater productivity by axiom A4 under the same two conditions.

Explanation E6

The greater the leader's aloofness, the less the group productivity.

Definition: Halpin's (1966) definition of aloofness is as follows: "Aloofness refers to behavior by the principal which is characterized as formal and impersonal. He "goes by the book" and prefers to be guided by rules and policies rather than to deal with the teachers in an informal, face-to-face situation. His behavior, in brief, is universalistic rather than particularistic; nomothetic rather than idiosyncratic. To maintain this style, he keeps himself--at least, "emotionally"--at a distance from his staff."

The more a leader is aloof in the above sense, the more he tends to violate the autonomy norm (C5) in that he is impersonal and nomothetic. This normative violation then results in less group-to-leader communication by axiom A2. Keeping the antecedent conditions of status-striving and work (C6 and C7) in mind, this reduction in group-to-leader communication determines less group member stimulation and finally, by axiom A4, the stimulation decrease results in a

reduction of group productivity.

Explanation E7

The greater the leader's production emphasis, the less the productivity of the group.

Definition: production emphasis, as defined by Halpin (1966) is "behavior by the principal which is characterized by close supervision of the staff. He is highly directive and plays the role of a 'straw boss'. His communication tends to go in only one direction, and he is not sensitive to feedback from the staff."

The production emphasis behavior with its close supervision and high direction tends to violate the autonomy norm (C5) of the research group. The greater the violation of this norm, the less the group-directed communication to the leader tends to be by axiom A2. This reduction in group-directed communication then effects reduction of stimulation of the part of group members by axiom A3 and the antecedent conditions of status striving and work (C6 and C7). Finally, by axiom A4 and conditions C6 and C7, the less the stimulation of group members, the less their productivity.

Explanation E8

The greater the stimulation of group members, the greater the group productivity.

Recalling the antecedent conditions of status striving and work-orientation (C6 and C7), the greater the degree of stimulation of group members, the greater the degree group productivity which occurs. This is axiom A4.

Explanation E9

The greater the thrust on the part of a leader, the greater the group's productivity.

Definition: "Thrust refers to behavior by the principal which is characterized by his evident effort in trying to 'move the organization.' Thrust behavior is marked not by close supervision, but by example which he personally sets. Apparently, because he does not ask the teachers to give of themselves any more than he willingly gives of himself; his behavior, though starkly task-oriented, is nonetheless viewed favorably by the teachers."— from Halpin (1966).

This type of leader behavior tends to reinforce the pre-existing work norm of condition C7 because the leader sets an example of high productivity. As high production is a method of status-striving, so the status-striving prescription (condition C6) is also reinforced. With both these norms strengthened, group productivity rises in response, according to axiom A1 which relates to the power of group norms.

Explanation E10

The greater a leader's consideration, the greater the group's productivity.

Definition: Halpin (1966) defines consideration in this sense to be "behavior by the principal which is characterized by an inclination to treat the teachers 'humanly', to try to do a little something extra for them in human terms." This is not the same consideration which relates to leadership style as given in explanation E2. Consideration as defined

above will hereafter be referred to as consideration I.

Behavior of the leader which involves consideration I implies communication between leader and group which would otherwise not exist. This increase in group-directed communication under the conditions of status-striving and work-orientation (C6 and C7) tends to effect greater stimulation on the part of the participants by axiom A3. The resulting stimulation then contributes to higher productivity by means of axiom A4 under conditions C6 and C7.

COROLLARIES

The hypotheses-to-be-tested are only some of the possible hypotheses that may be deduced from the theories presented. If the theories are broken down into their separate cause-and-effect units, these individual units such as the aforementioned axioms may be tested. Also, any combination of these cause-and-effect units, such as the relation between axiom A2 and axiom A4, which may be deduced by using axiom A3, may be tested, at least in principle. In this case, by axiom A2, the more violations of group norms, the fewer communications. And by axiom A4, the greater the stimulation, the greater the productivity. Linking these two axioms through axiom A3 which states that the greater the number and duration of communications, the greater the stimulation, then the result is that the more violations of group norms, the less the productivity.

It should be noted, however, that confirmation of the

predicted results tends to strengthen all aspects of the theory, so that the most useful test of the theory is that which encompasses all of its parts (Zetterberg, 1965b). In this way, the tests actually support or refute the entire cause-and-effect chain.

COVARIATES

A great many other variables besides the ten predictors may easily be seen to influence educational productivity. These factors range from the social to the psychological, economic, biological, and physical. The social factors include an individual's rank, which may well facilitate his ability to produce if he is a senior man because deferences are made to him. The opposite applies to a junior man who both defers and receives less deference. The receipt of a Doctor of Philosophy degree may indicate academic competence and resultant greater productivity compared to the receipt of a masters degree. Although the studies on morale (or esprit) are inconclusive, common sense might indicate that a research group may well function best in an atmosphere of high morale rather than low morale. The date of receipt of the highest degree which an individual holds may also be quite significant. If the date is very recent, this may indicate that the individual is just now embarking on an academic career and the teaching responsibilities may be absorbing energy that will shortly be directed toward research and publishing. If the date is over a decade ago, this may

indicate that the individual may have an inferior degree compared to his modern contemporaries or that he has had more time to be out of contact with the new developments in his discipline which are readily available to students. Another social variable of concern is the emphasis on publication found within a given department. An individual in a department with high publication emphasis may respond to such a departmental norm or simply be hired on the basis of high personal productivity by those in charge of the department who subscribe to that norm. In either case, where a high publication emphasis prevails, an individual is more likely to be highly productive. A final social factor is the number of graduate student assistants allocated to a professor. If this number is large, then both his teaching and research are expedited, resulting in greater productivity.

The psychological variable of primary concern in this study is that of an individual's orientation to teaching, research, or both teaching and research. If his orientation is towards teaching, it seems reasonable to suggest that his energies will be directed towards the students more than towards the more personal pursuits of research and publishing. If his is a research orientation, he may well register more highly on a publication index. And if his orientation is both teaching and research, it is difficult to say whether his teaching time detracts from his research pursuits or whether such teaching pursuits augment his research and publishing capabilities. The two economic variables to be

considered are the availability of travel funds and the amount of research grants received. A small travel fund allowance tends to curtail a person's ability to attend conferences at which he may deliver papers or generally contribute to academic discussions. The size of research grants that a person acquires tends to limit the extent of his research and his consequent ability to report findings which may result. The biological factor of major note here is that of age. This variable may tend to result in increased productivity as competence is gained through experience, or it may coincide with a reduction in creative potential with consequent reduction in scholastic productivity. The final variable, a physical one, is time. The time spent under the influence of a department head must be taken into account. This time factor must be limited to the time spent under the department head in question, otherwise the productivity to be measured may not be a function of conditions in that particular department at all.

CHAPTER III

METHODOLOGY

POPULATION

The statistical population was defined as those social scientists (excluding those personnel who were clearly in non-social pursuits) in the departments of Anthropology, Sociology, Psychology, Political Science, Economics, Educational Administration, Educational Psychology, and Educational Sociology in the five major universities in British Columbia and Alberta. These universities were the University of Alberta at Edmonton, the University of Calgary at Calgary, Simon Fraser University at Burnaby, the University of British Columbia at Vancouver, and the University of Victoria at Victoria. This statistical population states the limits of inference to which generalizations may be made from a sample of this population. The conceptual population, however, extends beyond the above population to those social scientists working under conditions not significantly dissimilar to those of the above social scientists. In other words, this study has tentative generalizability to universities beyond British Columbia and Alberta.

Although the above population defines 34 departments, four were eliminated from the population because they

contained two or fewer subjects. The original population estimate was made from the university calendars which were available at the time. As this estimate was made prior to most of the 1968 university calendars being made available, the use of 1967 and 1966 calendars resulted in the suppression of the population figure. When the individual departments were consulted, the population was found to be exactly 382 (which includes Simon Fraser University).

SAMPLE

As this study is mainly concerned with the relations between leader and group and among group members, the method of random cluster sampling was considered to be the most appropriate. If individual sampling were used, then a minimum number of subjects from each department would have to be chosen (at random from the entire population) in order to gain a measure of group consensus regarding the leader behaviors and colleagueal relations in question.

The random cluster sampling procedure was executed as follows: each of the 30 departments within the population was assigned a unique two-digit number. Then, by means of a straight pin and a table of random numbers, the departments to be included in the sample were selected in turn. As the selection continued, a record of the total number of individuals was maintained. When this total became approximately equal to 180 subjects, the selection was terminated. The sample size of 180 was chosen because a size of over 100 was

required for the intended method of analysis (with 100 being the absolute recommended minimum), because it was expected that a considerable number of subjects would not be available for the interview and because replacement with this sampling method is not possible. As a result, this original sample size was inflated to 47% of the population, a percentage well in excess of what might be considered normal sample size.

It was not attempted to stratify by either subject matter or by universities. However, the random cluster sampling technique resulted in closely representative samples for universities. Only two disciplines were poorly represented: economics had a small representation while sociology was over-represented in terms of the population breakdown for each subject area.

Table I gives an indication as to how the subjects were distributed across university departments. The first column, entitled "Population Total", lists the total number of individuals in the sampled departments, the total population by university, and the total population for the study. The second column, entitled "Department Sample Size" gives the number of sampled individuals per department and the total of sampled individuals by university. The third column, entitled "Predicted Sample Size", gives the initial sample size estimates based on the original population size estimate, The fourth and final column, entitled "Actual Sample Size" lists the number of subjects available to be interviewed by department, by university, and for the entire study. The

figures in parentheses below the four totals indicate the corrected totals after Simon Fraser University was excluded from the survey, the reasons for which are explained below.

TABLE 1

SAMPLING DISTRIBUTION BY UNIVERSITY DEPARTMENT

Department	Population Total	Department Sample Size	Predicted Sample Size	Actual Sample Size
University of Alberta				
Anthropology	7	7	6	4
Sociology	22	22	16	18
Psychology	22	22	20	9
Political Science	17	17	13	13
Educ. Admin.	14	14	15	11
Non-Sampled Population	44			
Total	126	82	70	55
University of Calgary				
Anthropology-Sociology	13	13	9	7
Educ. Admin.	6	6	3	4
Educ. Psychology	9	9	11	5
Educ. Sociology	3	3	2	3
Non-Sampled Population	40			
Total	71	31	25	19
Simon Fraser University				
Anthropology-Sociology	9	9	9	0
Non-Sampled Population	33			
Total	42	9	9	0

TABLE 1 (CONTINUED)

SAMPLING DISTRIBUTION BY UNIVERSITY DEPARTMENT

Department	Population Total	Department Sample Size	Predicted Sample Size	Actual Sample Size
University of British Columbia				
Anthropology	7	7	6	3
Sociology	12	12	10	6
Psychology	20	20	20	16
Political Science	14	14	12	8
Educ. Admin.	4	4	4	3
Non-Sampled Population	50			
Total	107	57	52	36
University of Victoria				
Anthropology-Sociology	7	7	7	4
Psychology	8	8	6	7
Political Science	6	6	4	3
Economics	7	7	6	5
Non-Sampled Population	8			
Total	36	28	23	19
Final totals:	382 (340)	207 (198)	179 (179)	129 (129)

It should be noted that the actual department size differed from that predicted (see Table 1). This is evident because of the absenses of certain professors from their offices during the period of time when data was being gathered at the university concerned. The discrepancy is also a reflection of the four refusals. These refusals account for 2%

of the sample reduction, while the absenses account for 33% of the attrition. Within this 33%, 12% is accountable to professors who had moved away to teach summer session, who had changed positions permanently, or who were on holidays. The four refusals (accounting for 2% of the attrition) gave most plausible reasons for refusal which, in the author's view, were not connected with productivity. This leaves 21% of the sample representing subjects unavailable for interview. Although it is correct that there were some instances of poor health which prevented some individuals from maintaining the usual office hours, it is also correct that some subjects maintained other offices or worked at home partly to avoid interruptions (such as productivity surveys). It would seem plausible that while some were away from the office on not-so-productive pursuits, it was evident that others were away at conferences or were participating in field research. The point to be made is this:- while the 21% of unaccountable non-returns is a high percentage, it would seem difficult to develop a rationale that would suggest that other than random bias influences the results actually collected. For each rationale developed that would introduce bias, there appears to be a counter rationale which would tend to reduce this bias to an acceptable level.

SURVEY PROCEDURE

All data-gathering for this aspect of the survey took place between May 23 and June 28, 1968. Time spent at the

various universities was: six days at the University of Alberta, broken into two sets of three days each with an interval of two weeks, three days at the University of Calgary, broken into two sets of one day and then two days, separated by two weeks, about ten days at the University of British Columbia, divided into two sets of five days each, separated by two weeks, and two days at the University of Victoria, separated by a month's interval.

As is easily understood, the topic of educational productivity is one which might be termed 'confidential'. As a result, it was thought best to secure the permission of the department heads in question prior to commencing interviews with any department members. The method of gaining access to the various departments was simply a telephone call from Dr. L.W. Downey, chairman of the Centre for the Study of Administration in Education, Faculty of Education, the University of British Columbia (the author's department head) to the department head whose department was next to be interviewed. A few heads of departments were contacted directly by the author. The purpose of the department head consultation was to inform these gentlemen of the purpose and procedure of the survey and to reassure them that it was confidential and that it would have no reflection on either departments or individuals.

Department head reactions were extremely varied. They ranged from slight apprehension to the statement that the study was a waste of time to the remark that the department

had just participated in a similar study. However, entree was granted in all cases and many of these gentlemen, either through personal investigation of educational productivity or simply by occupying the position of department head, had given considerable thought to the problem. Some offered excellent suggestions regarding the present study and other possible variations of it. The author is of the opinion that this brief conversation with each department head served to establish considerable rapport. It also resulted in direct aid such as the answers to questions regarding the department, lists of department members, and occassionally circulars which indicated the impending interview with its official sanction.

Regarding Simon Fraser University's exclusion from the study, when the head of the Political Science, Sociology and Anthropology department was telephoned by the author, it became clear that because this department had had three department heads in close succession, and because the present survey depended on a certain degree of continuity of departmental leadership over time, that this department was not suitable for investigation by this study. As a result, this department was deleted from the sample and since this was the only department representing Simon Fraser University, the university was deleted from the population of the study. It might be mentioned in passing that the four remaining universities are more homogeneous in many respects than the one deleted.

INTERVIEW PROCEDURE

The individual department members were then approached during normal working hours and when they were alone (insofar as was possible). Introductions were made in this way:

> "Excuse me, Dr. Andrews? I'm Dan Brown from the Department of Educational Administration at the University of British Columbia and we're interested in some of the leadership variables and work relation variables that we believe might affect an individual's productivity in a social science department such as this one. I was wondering if it were understood that any information I might gain would be completely confidential, would you be kind enough to give me a ten-minute interview on this, at your convenience?"

Department members reacted to the request for an interview in a number of different ways. Most interviewees elected to commence the interview at the time of initial inquiry, but some decided to postpone it for a few hours or a day. The ten-minute time demand, which usually lasted for fifteen minutes and on occasion continued for forty-five, did not appear to be onorous in any of the cases. Many had a few questions regarding details of the study, such as the study's purpose and for whom the author was working. Although most expressed little or no concern about the confidential nature of the survey, a few checked this point during the interview, and two challenged the author's certification to conduct such an interview (they were both satisfied). A few refusals were encountered. One did not wish to divulge departmental secrecy. Another was not interested in this kind of research topic. Two others refused outright, saying that they disagreed very much with the methods employed in survey research generally.

Most interviewees were given to commenting on the study but the general tone of the response could never be predicted (by the author) on the basis of any obvious criterion. Sociologists were sometimes most critical while psychologists were, at times, most enthusiastic. Those who had methodological interests tended to be critical of the instruments employed. Whenever criticism was encountered, the author agreed to it for the sake of tranquillity. Most remarks of a critical kind were quite well justified, in the author's view.

The interview progressed from questions on the man and his activities to a brief, thirty-three item questionnaire regarding the department head behavior and colleagueal relations within the department. The clarification of the occassional item was required, both on the agreement index and on the interview schedule itself (both described in detail below).

THE AGREEMENT INDEX

The instrument utilized as a measure of eleven of the predictors in this study is a variation on those devised by Andrew Halpin (1966), called the Leadership Behavior Description Questionnaire (which measures initiating structure and consideration II) and the Organizational Climate Description Questionnaire (which measures disengagement, hindrance, esprit, intimacy, aloofness, production emphasis, thrust, and consideration I). The Leadership Behavior Description Questionnaire (hereafter termed LBDQ) was constructed by administering a

number of sample items which described leader behavior to three hundred United States Air Force crew members who then rated their commanders on the items. A factor analysis was applied to the items and two empirically defined clusters emerged: initiating structure and consideration, which together accounted for 84% of the common variance. The published form of the LBDQ which has fifteen items for each dimension, has an estimated reliability of 0.93 for initiating structure and 0.86 for consideration.

The Organizational Climate Description Questionnaire (hereafter termed the OCDQ) had similar origins. A bank of about 1000 items which were statements about leader and group behavior (with specific reference to principal behavior and principal-teacher relations in public schools) was reduced to a total of eighty. These eighty items were administered to 1,151 teachers in seventy-one elementary schools with the responses being registered on a forced-choice Likert frequency scale. Factor analysis was applied to this instrument as well. The number of items was reduced to sixty-four and eight empirically defined clusters emerged, four relating to teacher group behavior (the first four mentioned above) and four relating principal behavior (the second four mentioned above). The development of both the above instruments is described in considerable detail by Halpin (1966).

During the earlier stages of this present study it was intended to apply the Halpin instruments directly to respondents in university departments. However it was noted that

some of the items were simply not applicable to the university scene. Some of the LBDQ items were not considered applicable because of the special superior-subordinate relationship which exists in a university department (as opposed to that in the United States Air Force). Many of the OCDQ items were directed specifically to the role relationships which exist in the public schools. As a result, two new instruments were devised. The Halpin instruments were changed by the deletion of some items, the addition of others, and the alteration of still others. In most cases, the changes were the substitution of "department head" for "he" or "principal" and the substitution of "department members" or "members" for "teachers" or "staff members". In all cases, the attempt was made to keep the substantive aspect of each dimension intact so that the reliability and validity of the original instruments might still retain some meaning.

The original instruments suffered two other changes in this study besides the alteration of the items. First, it was decided by the author that the frequency scale used by Halpin was inadequate when one considers the problem of intensity. In other words, in response to a statement such as "Father shouts at me.", the respondent who uses a frequency scale may register "seldom", while in fact, father may seldom shout but when he does, the entire city knows it. However, a respondent on an intensity scale would register "very loud" yet father seldom shouts. For the above reason, an agreement scale was used in the present study. This is

still a Likert scale and the respondents were asked to answer by indicating whether they strongly disagree, disagree, are uncertain (or neither disagree nor agree), agree, or strongly agree. This scale, registered on the integers 1 2 3 4 5, allows for frequency and intensity to be present in a single response. Unfortunately, it also demands the compromise of the two. One other aspect of this scale, as opposed to Halpin's scale embodying four choices, is that it allows an individual to make a neutral commitment. This approach is less profitable insofar as individual items are concerned, but in terms of the general responses and the cooperation of the individual who is willing to spend the time filling in an index purely as a favour to the interviewer, it is felt that the instrument may be less bothersome to complete as a result.

The second change to be noted regarding the instruments is that they were applied to a population different in many ways from that on which they were developed. In defense of such an application, it may be said that the LBDQ is of general applicability, while the OCDQ was developed from the responses of educators, and social scientists may certainly be termed "educators". However, it is noted that there exist many common sense differences between the social scientists in British Columbia and Alberta universities in 1968 and the American elementary teachers in 1963. The above fact serves as a warning that results from an untested instrument should be treated with due circumspection.

One final point of note is that one other dimension was added to the ten original clusters. This dimension, called "stimulation", was envisaged as one of special importance on the university scene and is included in the instrument on rational grounds only. By this it is meant that the criterion for inclusion of each item in this cluster is that of like content with the others and a defensible link with the theoretical definition of "stimulation".

The author is responsible only for the scale used in the above instruments. The alteration and content of the instruments is the work of others, as indicated in the "acknowledgements" section.

One familiar observation about university professors is that they tend to have little time. For this reason it was decided to curtail the above instruments so that they might be answered, along with several interview questions, within ten or fifteen minutes. It was found that if three items were selected from each subtest, then the thirty-three chosen items could be answered within a reasonable time. As a result, the three items that were chosen were those three deemed to be quite similar in content with the remainder and those which seemed the most suitable as operational definers of the concept being measured. Again, these items were chosen on rational grounds alone.

A copy of the agreement index has been included in the appendix.

INTERVIEW SCHEDULE

All information gathered during the survey that was not determined by the agreement index is contained in the interview schedule. This information may be subcategorized into two sections: that concerned with the covariates of productivity mentioned above, such as grants, personal orientation, and degree, and that which is used to form an operational definition of productivity itself, such as books published, conferences attended, and dissertations directed.

Productivity is defined in this study as the weighted sum of a number of separate factors. Although the weighting of each factor was determined by those in the population of social scientists, the factors themselves were initially established by the author in collaboration with the members of the Centre for the Study of Administration in Education at the University of British Columbia. It would seem appropriate here to discuss the reasons for inclusion of each part of the global concept of productivity.

The operational definition of productivity includes twenty-one separate variables. The three questions regarding books published, monographs published, and articles published during the time period was included because it is understood that publication is part of the normal role expectations for social scientists in this population. The same argument applies to work in press or work in progress. All are subject to the influences of leadership and work relation variables. The three questions relating to help with student theses and

dissertations account for another professorial role expectation. A further seven factors relate to some of the diverse activities which may be undertaken by university social scientists. Reviewing manuscripts for a publishing firm provides a service and is also a measure of professional recognition. Presence on the editorial board of a journal indicates both service and recognition as well. Being a guest lecturer at conferences and doing consulting work reflect role expectations outside the university. An officership or directorship in a professional association is another measure of both recognition and service. Participation at learned societies and attendance at conferences are measures of service within the educational sphere in terms of the transmission of knowledge among contemporaries. Finally there are teaching time and meeting time, both measures of service. The former is a reflection of service to students and the latter is an indicator of service to the department, faculty, or university.

A copy of the interview schedule has been included in the appendix.

THE MINISURVEY

The instruments used in the above survey were intended to gather data, which, when combined, would render a single score for the educational productivity for any given respondent. However, it became obvious that these data may be combined in any number of ways. It was apparent that weights

had to be assigned to each facet of productivity. These weightings could be assigned arbitrarily by the author, or by the author in consultation with his thesis committee members, or by a panel (part of the population studied) or by the subjects who were sampled. As there were twenty-six items to be weighted, it was decided to apply the weightings of a panel of judges to the productivity measure so that a final score of productivity might be calculated.

The statistical population of this minisurvey consists of those subjects in the departments of Economics and Educational Psychology at the University of British Columbia. The conceptual population, however, consists of those individuals who are not significantly different from the ones in the two departments above. A random sample of fifteen was selected using the same procedure as above, namely, by assignment of a two-digit number to each subject and chosing the sample through the use of a pin and table of random numbers.

As no confidential information was to be gained, no department heads were consulted and subjects were approached directly, during normal working hours and when alone whenever possible. The author introduced himself, explained his purpose in calling, and requested the subject spend about ten minutes in filling in what he would consider to be just weights on a quantitative productivity instrument. Two refusals were registered in the minisurvey as well. Both disagreed enough with such a quantitative approach to educational productivity that they did not wish to participate in the construction of

a quantitative instrument. Replacements were made for those who were not available and for those who refused. As two were not available, the replacement percentage is 26% and this is not considered to bias the results unduly. The refusals contribute to 13% of the replacement but as no obvious rationale is evident as to why the responses of the refusers should be substantially different from those who considered themselves productive in other than quantitative ways, this replacement figure is disregarded.

A copy of the productivity index has been included in the appendix.

A METHODOLOGICAL NOTE

Prior to the analysis of the findings of this study, some attention should be given to the soundness of the procedures on which the conclusions are based. This section is devoted to a discussion of some of the methodological difficulties which were encountered by this survey.

As modern universities are characterized by frequent shifts of personnel, it might be expected that the average time span for departments to have some influence on their department members might be rather short. Professors are geographically mobile and department headships are frequently filled only to be vacated shortly thereafter. Because of this problem, the underlying assumption of continuity which pervades this study is only partly fulfilled.

Another problem regarding the application of a theory of

small to a university department is: does a large department fulfill the size requirement implicit in the assumptions outlined earlier? Are not sub-groups discernable in a department of eighteen members? Is it not possible that the leader behavior toward certain sub-groups may be different from the leader behavior toward others? Whatever the basis for the sub-group formation, is it not likely that the work relations will vary between sub-groups?

The status of the productivity concept as a dependent variable is also seen as a difficulty. This study attempts to account for the prediction of a list of predictors and covariates of productivity as a dependent variable. It is not difficult to appreciate the possibility that productivity many, in turn, influence some of the independent variables of this survey. Any causal relationships which are imputed to the results may in fact be reciprocal.

Regarding the instruments used in this survey, it is noted that neither has been pretested as a check for reliability or validity. Their validity rests on intuitive appeal with some reference to an empirical foundation in the case of the adapted LBDQ and OCDQ. One interesting criticism encountered during the interviewing was that the productivity instrument, because of its quantitative approach, defines a "busy" man rather than a "productive" man. Insofar as these men are the same, that is, insofar as productive men are busy and vice versa, the instrument has some validity. However, when the professor who publishes productively (in the

estimation of his colleagues) but only publishes rarely is rated by such an instrument, he tends to be scored as a low producer. The same criticism applies to the subject who is known as an excellent teacher, a key contributor to departmental affairs, or invests his time as a political activist.

An effort to overcome this serious problem was made by the author during the formulation of the productivity instrument. However, it became evident that the introduction of qualitative aspects to the measure was beset with more difficulties than the straightforward quantitative measure which was used. A suggestion was made to give each publication mentioned by the respondents a rating on the basis of its publisher. It is well known that certain publishing houses and journals are rated highly by certain disciplines, while other outlets are considered second class or unknown. Although panels could have been established in each discipline to judge each outlet, this would not be a defensible indicator as to the quality of a book or article. For example, a journal in biology which is unknown to anthropologists may accept a high quality article from an anthropologist because of the article's relevance to a topic in biology. Another approach that was considered was the assessment of department members by each other on an overall productivity rating. This technique, while it has obvious validity, lack the comparability required for a large-scale study involving a considerable number of variables.

The major disadvantage of this research appears to be

that it was carried out "in situ". The fact that the investigation was conducted in a "real life" environment contributes greatly to the problem of control of variables. It is never desired to control all possible variables, but only for those factors for which a rationale may be developed which would indicate that those certain factors have an influence on the dependent variable. Control is then focused on the systematic error bias. It is understood that error due to random influences on productivity is not of major concern because these influences are indeed random and not systematic. However, with a limited number of independent variables taken into account, any factors which are not controlled are confounded with those which have been measured. Here are some of the non-controlled variables which are confounded with the independent variables and the influence of which tends to reduce any in situ study to a descriptive and speculative level: hiring practices, effects outside of the time span specified, stimulation from outside the department, the presence of informal leadership, the special status of an acting head as compared to a full head of department, and various personal orientations such as theoretical, methodological, administrative, and non-behavioral. With these and other influences operating on the dependent variable, it is difficult to say whether the variation in productivity is due to the factor suggested by the statistics or is actually due to another source of variation.

One further warning is appropriate. The topic under

investigation does not allow any kind of approach other than an ex post facto attack on the problem. As there is no manipulation of variables involved (but merely an attempt to measure them), the results must be viewed with some circumspection for this reason as well.

PREPARATION OF THE DATA FOR REGRESSION

First the data gathered in the agreement index and the interview data were combined and transformed into variables suitable for use in regression analysis. The following is a commentary on how these adjustments were made.

As the reader may recall, the data gathered in the agreement index represented eleven variables each having three items each to which the respondent gave an answer on a five-point ordinal scale which extended from strong disagreement to strong agreement. In order to make the data suitable for regression analysis, let us first consider the case where the results indicated that the response distribution to all the items of a particular variable were normal with a mean of "3". As the normal curve is symmetrical, it may be asserted that with these particular items, f(2) must equal f(4) and f(1) must equal f(5). Again, because the normal curve is symmetrical, the random, independent variable distance from "2" to "3" equals the distance from "3" to "4", and the distance from "1" to "3" equals the distance from "3" to "5". But, it is stressed, nothing may be mentioned about the distance between "1" and "2" as compared to that

between "2" and "3". The above argument is valid as long as a normal (or more important, monotonic either side of the mean and symmetrical about the mean) distribution involving an infinite number of cases is assumed. Thus the ordinal scale could be transformed into an interval one if responses "1" and "5" were removed. However, this would result in the loss of crucial data, at the extremes of the scales. The problem of having either an ordinal scale or interval scale for regression may be overcome by finding the average of the responses f(1) and f(2), to result in the number f(x). This number has its unique counterpart on the independent variable axis, namely "x". As may be seen, this "x" would be located near to what is "2" and to the left of it. The same procedure may be applied to f(4) and f(5) to render a point just to the right of "4". Let this new point be named "x'". Again, because of the symmetric and monotonic property of the curve, these two new points are equidistant from the midpoint "3". Hence, the original ordinal scale may be collapsed into an interval three-point scale with a wider range than the original "2", "3", "4" scale. Arithmetically, this new scale may be constructed by transforming all "1's into "2"s and all "5's into "4"s.

The rationale proceeds similarly for those items which do not render a response distribution which is approximately normal. In these cases, the distribution peaks at either "2" or "4". If the original assumption of a normal distribution on a variable still holds, then the question would

have rendered a normal distribution in the responses, were the response categories appropriate and not biased towards one extreme. From this it follows that the number of responses to one side of the mean should equal the number of responses on the other side. As a result, if the mean were located at "2", then the scale may be envisaged as a seven-point scale, with those responses which would have been located in categories "-1" and "0" having been registered in "1". Again, if the responses to the left of the mean (those in the hypothetical categories "-1" and "0" and in the real category "1") were averaged and an "x" were found to correspond to their f(x), and the same procedure is applied to the categories "3", "4", and "5", then the "x" and "x"" will define an interval scale of two equal lengths. It is acknowledged that this procedure is an approximation to the trichotomization discussed above. One further adjustment is necessary before the procedures are comparable: the scales which were empirically centred on "2" or "4" must be recentered on "3".

The thirty-three items in the agreement index were adjusted according to the method described. One final requirement was the combination of the trios of items into a single measure for each individual variable. As the levels of each item were made equal, the item scores were then added to give an overall score for each variable. This is seen as legitimate because the items for any given variable would have the same variance. The scales for the eleven

factors then consisted of seven points, ranging from '6' to '12', with a midpoint of '9'. A consensus measure among individuals was then calculated by averaging the scores of each factor over a group of individuals.

The covariates of productivity also were adjusted prior to their subjection to regression analysis. The measures that were understood to apply within the given time span had their scores divided by the time span in months. Two measures, that of the number of graduate assistants who were available to a given professor, and that of the number of years since the respondent's highest degree had been awarded (degree date) were then entered directly into regression. Two others, namely the departmental emphasis on publication and the availability of travel funds were adjusted in the same manner as the Halpin variables described above. The item on research grants received was corrected for those who had reported shared grants. When the grants were held jointly, the total amount was equally divided among all recipients and this amount was then combined with any others received as a sole recipient by the respondent.

The remaining covariates were first dichotomized (or trichotomized) and then entered into the regression as dummy variables. First, considering personal orientation, four responses were registered: towards research, and towards teaching and research jointly. As the development category was viewed as having greater similarities with the teaching orientation than with the other categories, the two 'developers'

were placed in the teaching category. As this variable was trichotomized, it introduced two dummy variables into the regression: the first was equal to '1' if a respondent's orientation was to teaching (and '0' otherwise); the second was equal to '1' if the respondent's orientation was towards research (and '0' otherwise). The final category, that of a joint orientation to research and teaching, was taken as the base on which the other results of the two dummy variables were compared. The items reporting degree, rank, and approximate age were dichotomized in a like manner. The degree category elicited only two responses: a masters degree or a doctorate. A single dummy variable was introduced such that its value was '1' when the degree was a doctorate, and '0' when the degree was not. In this way, the results would indicate if the presence of the doctorate was concurrent with greater productivity. The ranks as reported, formed the five categories of lecturer, instructor, assistant professor, associate professor, and full professor (or their equivalents). Two categories of ranks were formed: junior and senior, the senior being the associate and full professors, the junior the remainder. It should be mentioned in passing, that in the case of post doctoral research fellows, their rank at their home campuses was the rank reported. The dummy variable was then given a value of '1' for the seniors and '0' for the juniors, thus using the juniors as a base. Finally, the item of approximate age was dichotomixed into those over and under forty years, and the younger group was again used as a

base.

The results of the minisurvey, provided the weightings which were used to combine the diverse items relating to productivity. The final productivity score was calculated by finding the weighted sum of books published, monographs published, articles published, books in press, monographs and articles in press, books in progress, monographs and articles in progress, doctoral dissertations directed, doctoral committees, masters theses directed, positions as manuscript reviewer, positions as officer or director of a professional organization, number of times a guest lecturer, number of editorial boards of journals, number of papers given, panels participated in, and meetings chaired at meetings of learned societies, number of conferences attended, plus a special weighting of teaching and time spent in meetings.

EXPLORATORY ANALYSIS DISCUSSION

One of the functions of research, expecially research in a professional faculty such as education, is to discover what information may be gained through prediction alone rather than solely to test theoretically derived hypotheses. In other words, if the relationship between two variables is found it is not always necessary to establish a possible explanation to account for the relationship. The discovery that one variable predicts another may have many practical possibilities yet have no immediate theoretical importance. In accordance with the above argument, one aspect of the

analysis of the data gathered in this survey is devoted to methods which were not planned when the study was devised. It was felt that such efforts would be rewarded by the speculations and possible practical applications to which they might give rise.

It is possible to analyze the data, not just on the basis of group consenses of all members of a university department, but also from the personal or perceptual point of view. Perhaps leader behavior and work relations influence an individual's productivity more directly as the individual himself perceives the leader behavior and working climate in a department. Perhaps leader behaviors and work relations vary sufficiently from subject to subject such that each man actually works in a university department which he perceives quite differently from his colleagues. Because of these considerations, it was decided to analyze the data according to individual responses alone, with no measure of group consensus being taken into account.

Still in an exploratory vein, it was discovered that the teaching and committee meeting items in the minisurvey registered a large standard error of their means when the data were being processed to locate the means. Further investigation indicated that the minisurvey respondents could be easily divided into two sets: those who rated teaching and committee meeting services as being highly productive enterprises, and those who rated them comparable to the other aspects of educational productivity. Evidently those with a teaching

orientation (hereafter mentioned as 'teachers') have a different concept of productivity from those who have a research orientation (hereafter named 'academics'). This distinction did not appear to be related to any obvious consideration such as faculty. In accordance with the above, it was decided to analyze the data in three other ways: according to the orientations of teachers, academics, and teachers and academics combined (the combined method being the original plan).

The data were then analyzed in six ways:

- On a group basis with academic and teacher weights (original plan)
- On a group basis with academic weights
- On a group basis with teacher weights

- On an individual basis with academic and teacher weights
- On an individual basis with academic weights
- On an individual basis with teacher weights.

EXPLANATION OF REGRESSION ANALYSIS

Regression analysis is a statistical method wherein it is attempted to establish a relationship of prediction between a set of predictor or independent variables and (in the present case) a single dependent variable. This relationship is illustrated in its most simple form by the example: $Y = a + bX$, where Y is the dependent variable, X is the independent variable or predictor, a is the value of the prediction when $X=0$, and b is the slope of the line in this straight-line relationship (the slope being the ratio of the change of the dependent variable for each unit of change of

the predictor). It should be noted, as in any statistical analysis, the Y which is predicted and the actual Y corresponding to any given predictor value X may be quite different. However, if it is established that the slope, b, has a very small probability of being equal to zero (as would be the case if the relationship were nonexistent) then it may be said that a trend exists. This method of trend determination may be extended from prediction equations where only one predictor variable is to be found to the case where several are included.

A multiple regression analysis, one which indicates the probability of the existence of a trend between each predictor and the dependent variable (with all other predictors being taken into consideration) was performed on the data to determine both the combined ability of all the independent variables taken together in predicting individual productivity, and the contribution of each in turn. This and the following analyses were carried out through the use of the Triangular Regression Package, a multi-purpose regression program available at the Computing Centre, University of British Columbia.

A stepwise regression analysis, one which selects those predictors which are best able to account for the variance in the dependent variable and at the same time have a high probability of their associated trends being non-zero, was also performed on the data. Results from this analysis indicate which are the most economical variables which might

be used for prediction of productivity. In the particular case of stepwise regression, the analysis was also carried out through the use of the computer program University of British Columbia STEP, an adaptation of the original Biomedical Computer Programs written at the Department of Preventive Medicine, University of California at Los Angeles.

A simple regression analysis (depicted in the above formula), which considers the predictive ability of each independent variable in turn and without reference to the other predictors, was performed on the data as well. This technique was used to determine if there were any independent variables which alone might be adequate predictors without having to take all the others into account.

CHAPTER IV

DATA ANALYSIS RESULTS

The predictor variables calculated on the basis of group consensus and the productivity variable calculated on the basis of the teacher and academic weightings combined were first analyzed using the multiple regression program. The results are summarized in Table 2.

TABLE 2

ANALYSIS RESULTS FROM MULTIPLE REGRESSION

COEFFICIENT OF MULTIPLE DETERMINATION: .3922

F-PROB.: 0.0000 STANDARD ERROR OF PRODUCTIVITY: 7.60

CONSTANT COEFFICIENT: 23.71 STANDARD ERROR: 26.34

PREDICTOR	PART. BETA COEFF.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
disengagement	.133	1.32	2.24	0.35	0.56
hindrance	.206	1.91	1.20	2.22	0.13
= esprit	.057	0.49	1.61	0.09	0.75
* intimacy	-.313	-3.98	2.17	3.35	0.07
+ aloofness	-.614	-5.03	2.67	3.54	0.06
* production emphasis	.372	3.72	1.94	3.67	0.06
* thrust	-.643	-7.44	3.36	4.90	0.03

TABLE 2 CONTINUED

PREDICTOR	PART. BETA COEFF.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
+ consideration I	.267	4.87	2.52	3.74	0.05
= stimulation	.210	2.32	2.28	1.03	0.31
= initiating structure	.116	1.12	2.04	0.30	0.59
consideration II	-.029	-0.30	1.93	0.02	0.85
+ student assistants	.447	2.89	0.47	25.58	0.000
= publication emphasis	.008	0.23	2.67	0.01	0.89
+ teaching orientation		-4.17	1.92	4.70	0.03
= research orientation		0.76	1.76	0.18	0.67
= travel funds	.089	1.83	2.55	0.51	0.48
grants	-.125	-0.001	0.001	2.05	0.15
= degree		3.33	2.32	2.05	0.15
= degree date	-.034	-0.06	0.18	0.10	0.74
= rank		0.41	2.04	0.04	0.82
= age		-0.91	2.10	0.18	0.67

'+' indicates a significant result (at the 0.10 level) in the predicted direction

'=' indicates a non-significant result in the predicted direction

'*' indicates a significant result (at the 0.10 level) opposite from the direction predicted.

The same data were then analyzed using the two stepwise regression computer programs. The alfa level for acceptance and rejection was 0.10, the same for both

programs. The results, which were identical, are given here.

TABLE 3

ANALYSIS RESULTS FROM STEPWISE REGRESSION

COEFFICIENT OF MULTIPLE DETERMINATION: .3106

F-PROB.: 0.0000 STANDARD ERROR OF PRODUCTIVITY: 7.60

CONSTANT COEFFICIENT: 32.00 STANDARD ERROR: 3.70

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
* hindrance	1.35	0.70	3.72	0.05
* intimacy	-3.46	1.00	12.15	0.001
+ student assistants	2.95	0.50	34.41	0.000
+ teaching orientation	-4.63	1.43	10.35	0.002

'+' and '*' as indicated in Table 2.

The residuals plotted by the computer from the Biomedical stepwise regression program were examined. A residual plot is a picture of the way the residuals (the difference between predicted and actual productivity values) vary along each independent variable in turn. For instance, for each stimulation measure of 6.0, there is one predicted value for productivity, and the values greater than and less than the predicted value which correspond to those subjects who have a stimulation measure of 6.0. Plots are examined because they are clear visual indicators which inform the investigator if the assumptions made during the regression analysis were in fact warranted. These cardinal assumptions

concerning the regression errors are: the errors are independent (randomly influenced by other factors); the errors have a zero mean; the errors have a constant variance; and the errors have a normal distribution. While the errors are independent insofar as other variables could be taken into account in this study, and while the errors have a zero mean because a constant term appears in the model, the plots indicate most clearly the applicability of the regression model (the model determines if some of the predictor variables should be represented as squared or cubic terms in the equation instead of simple linear terms as in this study). The plots were examined and the errors appeared to have a constant variance, to have a normal distribution, and there was no evidence of lack of fit that might indicate the presence of curvilinearity.

The data were then analyzed by the simple regression program to determine the presence of any outstanding predictors which are able to predict independently of the other independent variables. Results are reported in Table 4.

The results of the multiple regression analysis indicate that some variables vary as predicted with the dependent variable, others vary as predicted but not significantly, and still others vary in the opposite direction from that predicted. Aloofness, consideration I, thrust, intimacy, production emphasis, hindrance, the number of student assistants, and a person's orientation towards teaching emerged as significant predictors of educational produc-

tivity. Insofar as the manipulations on the leadership and work relation variables allow them to be considered as interval scale variables, then some comparisons may be made among these and the other significant covariates as to their order of superiority of prediction. If the scales remained ordinal, regression analysis could be legitimately applied to them because the beta coefficients would retain their signs under any monotonic transformation. However, there would be no basis for comparison insofar as relative predictibility is concerned.

TABLE 4

ANALYSIS RESULTS FROM SIMPLE REGRESSION

PREDICTOR	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
hindrance	0.024	1.45	0.81	3.17	0.07
aloofness	0.030	1.41	0171	3.88	0.04
production emphasis	0.041	2.03	0.86	5.46	0.02
student assistants	0.190	2.81	0.51	29.69	0.000
teaching orientation	0.065	-4.79	1.61	8.76	0.004
degree	0.040	5.40	2.12	6.47	0.01

On the basis of the partial beta coefficients, it would appear that the order of predictive power is: thrust, aloofness, number of student assistants, production emphasis, intimacy, and consideration I, with the status of teaching orientation being indeterminate. Other variables also contributed as prodictors, but non-significantly. The variables which covary in the

predicted direction, even though their beta coefficients were not significant were: esprit, stimulation, initiating structure, publication emphasis, research orientation, travel fund availability, degree, degree date, rank, and age (which was predicted in both directions). The coefficient of multiple determination (R-squared), accounted for 39.22% of the variance in productivity. The central differences between the multiple regression and stepwise regression analyses were that hindrance was considered significant in the latter but not in the former, and that the R-squared value for the stepwise regression was considerably lower. The simple regression results, obtained chiefly for interest purposes, registered differently from the other two analyses, as might be expected. Three variables are of note because they predicted (non-significantly) in the direction opposite from that suggested in the theory section. They were consideration II, disengagement, and the amount of research grants received.

CHAPTER V

DISCUSSION OF RESULTS

This investigation indicates that aloofness (the extent to which a leader is bureaucratic), consideration I (the extent to which a leader treats his staff "humanly"), thrust (the extent to which a leader sets an example), intimacy (the social dimension), production emphasis (leader behavior which is narrowly focused on production), and hindrance (the extent to which "busywork" annoys the work group) emerge as significant social predictors of educational productivity. The number of student assistants and a person's orientation towards teaching (as compared to others whose orientations are towards both teaching and research) also registered as significant. However a note of caution should be interjected here. Prediction does not necessarily imply causation. Statistical results cannot by themselves illuminate any determinants of productivity-- they can only make inferences, which, when aided by explanations are able to suggest causal relationships which are always subject to further verification. Assuming methodological soundness, an investigator must turn to his theory (explicit or implicit) to check if his findings "make sense".

The methods of further verification must be directed

towards the inteterminate results of this survey. It was found that esprit (morale), stimulation (the extent to which ideas are exchanged), initiating structure (leader directiveness with regard to the entire group), publication emphasis (for salary increase and promotion), research orientation (again as compared to those whose orientation is both teaching and research), the availability of professors' travel funds, the receipt of a doctorate (as compared to a masters degree), the date of the highest degree, a man's rank (senior rank as opposed to junior), and his age (over forty as opposed to under forty) all predicted a change in productivity in the same direction as was done in the theory section but not beyond the possibility of a chance prediction alone (not significantly).

Some note should be taken of those predictors which were significant yet in the wrong direction from that hypothesized or suggested in the theory section. These were intimacy, production emphasis, and thrust in the multiple regression and intimacy along with hindrance in the stepwise regression results. Obviously, alternate explanations are in order. When the adapted Halpin instrument is consulted with these results in mind, some different explanations suggest themselves.

With regard to intimacy, the emphasis is very much on friendship almost to the exclusion of others beyond the department in question. The three items, mentioning the location of closest friends in the department, the home visits

of department members, and conversation about personal lives in the department might be construed as an insularity dimension as well as a fraternal one. If this is indeed the case, then if insularity leads to low productivity, it might be predicted that those of high intimacy (as construed in this way) may well be less productive.

The original Halpin definition of production emphasis implies a leader who might well violate the norms of a university work group. However, if the leader's role is viewed liberally by those in the work group, actions such as determining teaching assignments, ensuring colleagues work to capacity and insisting that departmental regulations be followed may be viewed as some of the legitimate role expectations of a departmental leader. If, then, production emphasis has been operationally defined as a guidance dimension wherein departmental operations are expedited, then it is possible that those departments having "smoother operations" may well tend toward greater educational productivity.

The problem regarding the variable of thrust may be answered similarly. Again, if the operational definition is consulted, the words "department head works longer hours than department members", "the department head offers constructive criticism", and "the department head sets an example by working hard himself" are those to which the interviewees responded. The two items on the department head's work habits are answered from the point of view of the work group, that is, with reference to the group's own work habits. Is it

not possible that those groups which are less productive yet have a leader who expends an average work effort would tend to rate him high on effort because they themselves are relatively less inclined to work as hard as the department head or work the same number of hours? The opposite also holds. Those department members who are very hard workers would seldom indicate that the boss works longer hours or that he works longer hours or that he works hard because what an average professor would regard as working hard to them is just a normal expenditure of effort. If, in fact, hard work and high productivity vary together, then it seems reasonable that this dimension would be negatively correlated with educational productivity.

Finally, the results indicate that the concept of hindrance also varies with productivity in the manner opposite from that which was predicted. It is proposed to consider the hindrance problem from the same point of view in which the thrust counterexplanation was offered above. The operational definers of hindrance relate to such concepts as the interference of routine duties, burdensome committee work, and the problem of paperwork. Again, the more productive respondents may view these obligations as being much more onorous than those who are less productive. As a result, those high in hindrance are associated with high productivity while those low in hindrance are associated with low productivity. (This argument assumes, of course, that any given individual's time is limited and that, on the average, a high

individual productivity demands a high time investment and a considerable work effort.)

Is it not possible to reverse any rationale suggested by the theory so that the results of a study may be accommodated? In the author's opinion, the potential for reverse rationales among the variables considered in this survey has been virtually exhausted. Only one of the remaining variables (disengagement) appears to lend itself to such an opposite interpretation as do the above four.

Some mention should be made of the three variables, which, though they were not significant predictors, did register results contrary to those suggested by the theory section. These were disengagement (group non-involvement), consideration II (leader-staff relations involving warmth, respect, trust and friendship), and amount of grants. Disengagement may vary positively with productivity if, again, those who are highly productive tend to respond positively to the items used as disengagement measures. Very tentatively, it may be suggested that consideration II represents an insularity dimension in terms of its three items. With regard to grants, the poor quality of such a measure tends to greatly reduce its considerable potential predicting power. (An individual may produce on the basis of grants previously received.)

CHAPTER VI

CONCLUSIONS

SUMMARY OF RESULTS

The results of this survey have significantly linked a number of the independent variables with the dependent variable. When a department head's behavior is characterized by aloofness (actions which are formal and impersonal, nomothetic and bureaucratic) group productivity is reduced in his department. In other words, the greater the aloofness, the less the productivity, and the obverse holds as well. When a department head shows consideration I (an inclination to treat staff members "humanly"), the group productivity is increased, with the obverse holding in this case as above. The more student assistants which a given professor has at his disposal, the greater his individual productivity. And if a department member indicates that his personal orientation is towards teaching, then his productivity may be predicted to be lower than a man who indicates research or both teaching and research as his personal orientation.

Further results indicate that a number of other predictors are less conclusively linked with educational productivity. Keeping in mind that any conclusions to be reached are most tentative, it would appear that high group esprit, stim-

lation, high leader initiating structure, sizeable travel allowances, a research orientation, a doctorate, a degree recently awarded, and senior rank all contribute to the educational productivity of an individual. However, it appears that with advancing age (and receeding date of degree), productivity is likely to be lessened.

The exploratory results indicate (again, tentatively) that there are relatively minor differences between analyses based on individual responses as opposed to group consensus, and among analyses based on those with combined teaching and academic orientations as compared to those with academic orientations as compared to those with greater sympathy for teaching. Judging on the basis of number of significant predictors and percentage of productivity variance explained, it would seem that the original analysis, planned on the basis of group consensus with regard to leader behavior and work relations, and on the basis of general consensus regarding the weights for aspects of productivity, was superior to any of the exploratory analyses.

COMMENTARY

This thesis has attempted to describe and account for one small aspect of the behavior of professional personnel in a modern bureaucracy. The belief in the existence of the social determinants of behavior which are comparable in power to physical, biological, economic, or psychological determinants has been tentatively supported through the investigation of predictors which have probable causal relations with

the elusive concept of educational productivity.

From the point of view of the educational administrator, the "practical man" with the requirement for techniques of optimization of role fulfillment, a few prescriptions are in order. It would appear that a university department head is able to facilitate the productivity of his staff members. Despite the wide acclaim of professorial independence, the actions of department heads and the behaviors of colleagues are apparently able to influence the amount of output of such scholars. It is possible, then, through the suppression of behaviors described by aloofness and the stress of behaviors described by consideration I, and through the manipulation of group variables, to create a "climate" within a university department which is highly conducive to educational productivity.

This thesis was also undertaken with a view to theory construction. Generally, the results appear to lend support to the explanations offered in the theory section. Four factors which were notable exceptions to this trend of support were: intimacy, production emphasis, thrust, and hindrance, as they were operationally defined in this study. While possible alternative explanations were offered, it should be noted that these had their basis in the methodology of the study rather than in theory. The only theoretical consideration raised was that productivity may be viewed as an independentent variable as well as a dependent one. The author is of the view that although the supportive evidence for the

theory is only partial, none of its explanations should be discarded until further investigation is undertaken.

A comment on the limits of generalization of the thesis results is warranted. It was mentioned in the methodology section that while the statistical population is limited to the four universities from which the sample was drawn, the conceptual population encompasses all those institutions which are not sufficiently dissimilar from those sampled. With increasing caution, inferences may be extended to those social science departments in Canada, to all research departments in North American universities, and to all research departments in North American research institutions. Finally, but with the most reservation, the findings may perhaps be generalized to all departments in both knowledge-producing and knowledge-transmitting organizations within our general cultural boundaries. This last inference, while highly speculative, would apply to virtually all educational organizations and their respective educational productivities.

FURTHER RESEARCH

Research on this topic may be extended on the basis of the theory presented. Thy hypotheses which were chosen for investigation in this study are only a few of many possible alternatives. Other corollaries which may be derived from the theory are the individual cause-and-effect units themselves. Different combinations of these units also provide considerable challenge to the empirical investigator. For instance, does the leader's violation of the autonomy norm

imply a reduction in group stimulation? A suggestion which relates to the theory but does not follow from it is this: research may be carried out when the antecedent conditions of the theory are manipulated. In other words, given that some of the conditions of the small group-- the presence of the formal leader, the task-orientation of the group, the group autonomy norm, and the work norm-- are not present, which of the deduced relations still hold? Theory building and empirical testing of this variety could lead towards a substantiated, general theory of work groups which might be applicable under many conditions.

The study of the concept of educational productivity may be undertaken in many ways. Focusing on the productivity instrument for a moment, and recalling the comments regarding its quantitativity and its lack of any attempt at validity, it might be suggested that any future productivity study be undertaken with some qualitative base in mind. The thought of having each department member rate the overall productivity of each other member has its practical difficulties but also its obvious benefits. Interdisciplinary and interdepartmental considerations come into play here. Perhaps the concept of productivity itself (a global one) could be broken into some major areas such as teaching and student service, administrative and departmental service, and research or professional service. In this way, one department member could be given three ratings. The thought of looking at the pay of a professor also has its merits: "Let the market be your guide".

Yet some markets have deliberately fostered their separate promotion and salary plans and many professors find salary as being only one of many position considerations, others being prestige, research opportunity, funds, and favourable teaching and administrative loads. The best advice with regard to a productivity instrument seems to be the warning that whatever the instrument selected, it is open to considerable circumspection. Practical inconvenience aside, the application of a number of instruments which give rise to a composite score would seem to render the fairest appraisal of a man's productivity in a university setting. The problem of instrument validity is also a difficult one. As was indicated above, the productivity instrument used in this study largely defines a busy man, but less so a productive one.

As was the case in this study, an instrument such as the agreement index which is constructed on largely rational grounds is difficult to defend. The solution to this problem is the construction of an instrument which has its clusters defined empirically.

THE EDUCATIONAL ADMINISTRATOR

Is it possible to devise an instrument so complete that it might be put to practical use in educational administration? It is conceivable that one day educators may come to rely on such an instrument as an aid to assessment for promotion? While crudeness of instrumentations prohibits present utilization by practitioners, future measures may indeed become commonplace in the educational organizations of tomorrow.

At present, the warning should be heeded that reliance on such instuments might well lead to abuse if the many other intuitive indicators of productivity are not taken into account. The author wishes to emphasize that the results rendered from the measure of educational productivity used in this study must be treated most tentatively.

As for the agreement index, there are many possibilities for the growth of other superior instruments. Such devices could be used as sensitizers to discover the actual leader behaviors and working climate in any educational department. Leaders could then be impersonally alerted to the actions which might be taken in order to foster greater educational productivity on the part of their subordinates. Again the caution is given that an administrator using instruments such as this must take all known factors into account and then, with common sense as guide (but not master) he may better administer his department.

BIBLIOGRAPHY

Anderson, B., "Status Classes in Organizations", Administrative Science Quarterly, 1966, vol. 11, p.264.

Baumgartel, Howard, "Leadership Style as a Variable in Research Administration", Administrative Science Quarterly, 1957, vol. 2, pp. 344-360.

Baumgartel, Howard, "Leadership, Motivations, and Attitudes in Research Laboratories", Journal of Social Issued, 1956, vol. 12, No. 2, pp. 24-31.

Bennis, Warren G. "Values and Organization in a University Social Research Group", American Sociological Review, vol. 21, 1956, p.555.

Brown, Paula, "Bureaucracy in a Government Laboratory", Social Forces, 1954, vol. 32, pp. 259-268.

Bush, George P. and Lowell H. Hatlery, "Teamwork and Creativity in Research", Administrative Science Quarterly, 1956, vol. 1, pp. 361-372.

Caplow, Theodore, and Reece J. McGee, The Academic Marketplace, New York, Doubleday and Company, 1965.

Crane, Diana, "Scientists at Major and Minor Universities: A Study of Productivity and Recognition", American Sociological Review, 1965, vol. 30, pp. 699-714.

Davis, Robert C. "Factors Related to Scientific Performance Commitment", Unpublished Doctoral Dissertation, University of Michigan, 1957.

Durkheim, Emile, Le Suicide, Paris, Felix Alcan Library, 1930, p.277.

Eaton, Joseph W., "Social Processes of Professional Teamwork, American Sociological Review, 1951, vol. 16, p.707.

Evan, William M. "Superior-Subordinate Conflict in Research Organizations", Administrative Science Quarterly, June 1965, pp. 52-64.

Festinger, L. and J. Thibaut, "Interpersonal Communication in Groups" Journal of Abnormal and Social Psychology, 1951, vol. 46, pp.92-99.

BIBLIOGRAPHY

Glaser, Barney G., Organizational Scientists, Their Professional Careers, New York, Bobbs Merrill, 1964.

Glaser, Barney G. "Attraction, Autonomy, and Reciprocity in the Scientist-Supervisor Relationship", Administrative Science Quarterly, vol. 8, 1963, pp. 379-398.

Glaser, Barney G., "Variations in the Importance of Recognition in Scientists' Careers, Social Problems, 1962-63, vol. 10, pp. 268-276.

Golembiewski, Robert T. "Small Groups and Large Organizations" in James G. March, editor, Handbook of Organizations, Chicago, Rand McNally & Co., 1965.

Hagstrom, Warren O. "Traditional and Modern Forms of Scientific Teamwork", Administrative Science Quarterly, Dec. 1964, vol. 9, p. 241.

Halpin, Andrew. Theory and Research in Administration, New York, Macmillan, 1966.

Hill, Winston, W. and Wendell L. French, "Perceptions of the Power of Department Chairmen by Professors", Administrative Science Quarterly, 1967, March, pp. 548-574.

Kaplan, Norman, "Role of the Research Administrator", Administrative Science Quarterly, June 1959, vol. 4, pp. 20-42.

Katz, Daniel, and Robert L. Kahn, The Social Psychology of Organizations, New York, John Wiley & Sons, Inc., 1966.

Kornhauser, William, and Warren O. Hagstrom, Scientists in Industry: Conflict and Accommodation, 1962, pp. 131-133.

LaPorte, Todd R. "Conditions of Strain and Accommodation in Industrial Research Groups", Administrative Science Quarterly, June 1965, vol. 10, p. 21.

Lazarsfeld, Paul F., and Wagner Thielans Jr., The Academic Mind, Glencoe, The Free Press, 1958, pp. 7-10, 392-396, 402-406.

Manis, Jerome G., "Some Academic Influences on Publication Productivity", Social Forces, 1951, pp. 267-272.

BIBLIOGRAPHY

Marcson, Simon, The Scientistsin American Industry, Princeton University Press, 1960.

McEwen, William J. "Position Conflict and Professional Orientation in a Research Organization", Administrative Science Quarterly, vol.1, 1956, pp. 208-224.

Meltzer, Leo, "Scientific Productivity in Organizational Settings" Journal of Social Issues, 1956, No. 2, pp.32-40.

Pelz, Donald C.,"Some Social Factors Related to Performance in a Research Organization", Administrative Science Quarterly, 1956, vol. 1, pp. 310-325.

Pelz, Donald C., and Frank M. Andrews, Scientists in Organizations, New York, John Wiley and Sons, Inc., 1966.

Schacter,S., "Deviation, Rejection, and Communication", Journal of Abnormal and Social Psychology, 1951, vol. 46, pp. 190-207.

Schein, Edgar H. ot.al., "Career Orientations and Perceptions of Rewarded Activity in a Research Organization", Administrative Science Quarterly, March 1965, vol. 9, pp. 333-349.

Scott, W.R. "Reactions to Supervision in a Heteronomous Professional Organization", Administrative Science Quarterly, 1965, vol. 10, pp. 65-81.

Shepherd, Clovis, and Paula Brown, "Status, Prestige, and Esteem in a Research Organization", Administrative Science Quarterly, 1956, vol. 1, pp. 340-360.

Shepard, Herbert A. " The Value System of a University Research Group", American Sociological Review, 1954, vol. 19, pp. 456-462.

West, S.S., "The Ideology of American Scientists", I.R.E. Transactions on Engineering Management, Em.M.7,(1960), pp. 54-62.

Zetterberg, Hans. On Theory and Verification in Sociology, Totowa, New Jersey, 1965. (a)

BIBLIOGRAPHY

Zetterberg, Hans, On Theory and Verification in Sociology, Totowa, New Jersey, 1965, pp. 166-174. (b)

APPENDIX

UNIVERSITY DEPARTMENT QUESTIONNAIRE

(AGREEMENT INDEX)

Please circle your response to the statements below accourding to the following scale:

1. strongly disagree
2. disagree
3. neither agree nor disagree, or uncertain
4. agree
5. strongly agree

	SD	D		A	SA
1. Members of this department keep to themselves.	1	2	3	4	5
2. Routine duties interfere with research and teaching.	1	2	3	4	5
3. Members of this department show much team spirit.	1	2	3	4	5
4. Department members' closest friends are colleagues in the department.	1	2	3	4	5
5. Department meetings are dominated by department head reports.	1	2	3	4	5
6. The department head determines the teaching assignments and loads of department members.	1	2	3	4	5
7. The department head sets an example by working hard himself.	1	2	3	4	5
8. The department head helps department members solve personal problems.	1	2	3	4	5
9. Department members provide the type of interaction which promotes creative thinking	1	2	3	4	5
10. The department head's attitudes are made clear to department members	1	2	3	4	5

	SD	D		A	SA
11. The department head is concerned with the personal welfare of individual department members.	1	2	3	4	5
12. Members in this department ramble when they talk at department meetings.	1	2	3	4	5
13. Department members have burdensome committee responsibilities.	1	2	3	4	5
14. Department members accept the faults of their colleagues.	1	2	3	4	5
15. Department members invite colleagues from the department to visit them at home.	1	2	3	4	5
16. The department head runs the department meetings as if they were business conferences.	1	2	3	4	5
17. The department head ensures that department members work to their full capacity.	1	2	3	4	5
18. The department head provides constructive criticism	1	2	3	4	5
19. The department head helps staff members settle minor differences.	1	2	3	4	5
20. Research designs are influenced by interaction with fellow department members.	1	2	3	4	5
21. The department head informs department members what is expected of them.	1	2	3	4	5
22. The department head treats all department members as colleagues.	1	2	3	4	5
23. Department members strive extremely hard to advance their professional reputations.	1	2	3	4	5
24. Administrative paperwork is burdensome in this department.	1	2	3	4	5
25. There is sincerity and genuineness in interpersonal relations within the department.	1	2	3	4	5
26. Department members talk about their personal lives to colleagues in the department.	1	2	3	4	5

	SD	D		A	SA
27. The department head is "regulation-oriented".	1	2	3	4	5
28. The department head insists that previously established policies be followed.	1	2	3	4	5
29. The department head works longer hours than department members.	1	2	3	4	5
30. The department head attempts to obtain better salaries for department members.	1	2	3	4	5
31. Department members act as friendly critics for each other to assist in clarifying thinking.	1	2	3	4	5
32. The department head effectively coordinates the tasks of department members.	1	2	3	4	5
33. The department head is friendly and approachable.	1	2	3	4	5

The instrument is arranged as follows:

Variable	Statements
Disengagement	1, 12, 23
Hindrance	2, 13, 24
Esprit	3, 14, 25
Intimacy	4, 15, 26
Aloofness	5, 16, 27
Production Emphasis	6, 17, 28
Thrust	7, 18, 29
Consideration I	8, 19, 30
Stimulation	9, 20, 31
Initiating Structure	10, 21, 32
Consideration II	11, 22, 33

TABLE 5

RESPONSE DISTRIBUTIONS FOR AGREEMENT INDEX

Question	1	2	3	4	5	Mode
1	18	45	40	19	7	2
2	14	35	19	48	13	(3)
3	10	34	42	26	17	3
4	8	29	55	24	13	3
5	45	48	14	10	12	2
6	27	34	18	34	16	(3)
7	5	13	20	59	32	4
8	19	30	46	28	6	3
9	13	30	28	49	9	(3)
10	13	18	20	58	20	4
11	8	19	29	59	14	4
12	12	35	30	37	15	(3)
13	6	47	33	36	7	(3)
14	7	19	39	59	5	4
15	1	12	15	82	19	4
16	34	59	20	13	3	2
17	12	44	57	15	1	3
18	11	31	41	39	7	3
19	11	28	37	48	5	4
20	11	25	21	61	11	4
21	9	26	35	50	9	4
22	12	14	15	46	42	4
23	3	23	37	51	15	4
24	15	53	36	16	9	2
25	7	20	33	51	18	4
26	10	27	33	55	4	4
27	49	42	15	15	8	1
28	30	44	33	18	4	2
29	5	28	50	38	8	3
30	2	5	25	65	32	4
31	4	21	34	58	12	4
32	16	25	35	44	8	4
33	10	6	16	52	45	4

DEPARTMENT MEMBER INTERVIEW

1. University:
2. Department:
3. Department member:
4. Appropriate time for a 10-minute interview:
5. Could you tell me when you first joined the department? Insert this time of time under present department head, whichever is less. (Time "T")
6. Would you please respond to these questions on the basis of time "T"?
7. Could you please give me the approximate number of graduate students whose services you have utilized in this department (that is, those who have done directed studies for you, or have been assistants to you) during time "T"?
8. What, would you say, would be your average number of hours per week spent with helping students, course preparation, classes, marking; your teaching function generally?
9. What might be your average number of hours per week spent with meetings?
10. To what extent would you say that the basis for promotion and salary increase in this department is publication and related activity? Is this emphasized considerably (4), about average (3), or less than average (2) (a five-point scale)?
11. What would you say was your main interest prior to join-

ing the department? By this I mean, was it teaching (1), development (2), research (3), or what? (Both, (4)).

12. Regarding the availability of travel funds from university sources, would it be excellent (1), very good (2), good (3), fair (4), or poor (5) in your judgement?

13. Approximately how many conferences have you attended since time "T"?

14. Could you please tell me the total value of any grants you may have been awarded during time "T" and the number of recipients of each grant if it was shared?

15. Are you any of the following: Are you a manuscript reviewer of a publishing firm? Are you an officer or director in a professional association? Have you been a guest lecturer at a conference? On the editorial board of a journal?

16. Do you do consulting work for government or another agency. (If yes, how many projects?)

17. Have you made an appearance on the program of a learned society? (If yes, was it to give a paper, sit on a panel, or chair a meeting?)

18. Have you directed any masters theses during time "T"?

19. Have you directed any doctoral dissertations during time "T"? (If yes, were you major adviser, committee member?)

20. With regard to publication, do you have any books in progress?

21. Any monographs or articles in progress?

22. Do you have any books <u>in press</u>?

23. Do you have any monographs or articles in press?
24. Have you published any books in time "T"? (If yes, could you give me the name of the publishing house, please?)
25. Have you published any monographs?
26. Any journal articles? (in time "T")
27. Your degree please? (M.A. (2), Ph.D. (3))
28. And its date?
29. And you are a (an) (fill in with rank one above the most likely)? (instructor (1), assistant professor (2), associate professor (3), full professor (4), lecturer (5))
30. Approximate age:
31. Fine. Would you please fill this out? It's an agreement index going from disagree on the left to agree on the right. It takes a couple of minutes.
32. Thanks for time and kind cooperation.

TABLE 6

SELECTED RESPONSE DISTRIBUTIONS FOR DEPARTMENT MEMBER INTERVIEW

Ques.	Topic	0	1	2	3	4	5	6	7
7	student assistants	28	23	30	16	16	7	8	3
10	publication emphasis		3	18	60	45	4		
11	personal orientation		33	9	46	42			
12	travel funds		36	43	27	9	15		
15	manuscript reviewer	115	13	1	1				
15	officer or director	194	22	4					
15	guest lecturer	65	33	15	7	2	4	3	2
15	editorial board	106	21	3					
16	consulting projects	76	32	13	5	4	1		
17	gave paper	75	31	13	6	3	2	1	
17	on panel	111	19	1					
17	chaired meeting	121	10						
18	theses directed	56	24	16	15	11	3	2	4
19	dissertations directed	87	24	10	4	4	1	1	
19	doctoral committees	69	20	16	11	6	6	3	
20	books in progress	66	49	12	4				
21	monographs or articles in progress	23	20	33	22	13	12	7	1
22	books in press	124	4	2	0	1			
23	monographs or articles in press	89	23	10	5	2	1	1	
24	monographs published	102	20	7	2				
27	degree		0	21	108				
29	rank		0	63	43	19	5		

TABLE 7

CORRELATION MATRIX FOR ALL VARIABLES

KEY:

1. disengagement
2. hindrance
3. esprit
4. intimacy
5. aloofness
6. production emphasis
7. thrust
8. consideration I
9. stimulation
10. initiating structure
11. consideration II
12. student assistants
13. publication emphasis
14. teaching orientation
15. research orientation
16. travel funds
17. grants
18. degree
19. degree date
20. rank
21. approximate age
22. productivity *

* dependent variable

	1	2	3	4	5	6	7	8
1.	1.00	0.13	-0.73	-0.34	0.43	0.31	-0.53	-0.61
2.		1.00	-0.28	0.09	0.48	0.21	-0.37	-0.24
3.			1.00	0.33	-0.57	-0.50	0.49	0.38
4.				1.00	-0.45	-0.38	0.35	0.18
5.					1.00	0.64	-0.71	-0.21
6.						1.00	-0.10	-0.00
7.							1.00	0.46
8.								1.00

	9	10	11	12	13	14	15	16
1.	-0.70	-0.67	-0.63	0.01	-0.01	-0.07	-0.08	-0.22
2.	-0.02	0.10	-0.22	0.10	-0.17	0.04	-0.11	0.01
3.	0.68	0.37	0.63	-0.05	0.14	0.10	0.04	0.07
4.	0.48	0.67	0.48	0.26	0.09	-0.18	0.15	-0.10
5.	-0.27	-0.26	-0.69	-0.02	-0.14	0.05	-0.12	-0.20
6.	-0.24	0.16	-0.31	0.03	0.02	-0.01	-0.00	-0.10
7.	0.47	0.65	0.81	0.11	0.41	-0.01	0.18	0.34
8.	0.26	0.37	0.48	-0.03	0.11	-0.12	0.15	-0.06

TABLE 7 CONTINUED

	17	18	19	20	21	22
1.	0.16	0.01	-0.11	-0.22	-0.12	0.02
2.	0.03	-0.10	0.04	-0.12	-0.05	0.15
3.	-0.17	-0.02	0.11	0.16	0.02	-0.09
4.	-0.04	0.01	0.04	-0.03	-0.18	-0.09
5.	0.11	0.06	-0.03	-0.08	0.02	0.17
6.	0.06	0.11	0.00	-0.01	0.08	0.20
7.	-0.11	0.10	0.04	0.10	-0.01	-0.07
8.	0.03	-.09	0.08	0.12	0.01	0.03

	9	10	11	12	13	14	15	16
9.	1.00	0.50	0.54	0.21	0.23	0.10	0.08	0.33
10.		1.00	0.59	0.04	0.17	0.07	0.06	0.41
11.			1.00	0.01	0.40	-0.11	0.25	0.25
12.				1.00	0.09	-0.14	0.09	0.09
13.					1.00	-0.12	0.13	-.33
14.						1.00	-0.51	0.06
15.							1.00	0.09
16.								1.00

	17	18	19	20	21	22
9.	-0.10	0.12	0.10	0.18	0.03	0.03
10.	-0.15	0.02	0.12	0.15	0.13	0.10
11.	-0.11	0.04	0.10	0.04	-0.05	-0.08
12.	0.10	0.21	0.00	0.09	0.09	0.43
13.	-0.06	0.11	-0.13	-0.03	-0.08	0.01
14.	-0.24	-0.15	-0.13	0.14	0.14	-0.25
15.	0.19	0.04	0.04	-0.08	-0.04	0.11
16.	-0.07	0.05	0.00	0.14	0.16	0.10

	17	18	19	20	21	22
17.	1.00	0.16	-0.00	0.04	-0.03	0.03
18.		1.00	0.09	0.32	0.01	0.22
19.			1.00	-0.44	-0.49	0.06
20.				1.00	0.62	0.09
21.					1.00	0.09
22.						1.00

MINISURVEY PRODUCTIVITY INDEX

Please assign a weighting to the items below on the basis of how you might gauge a colleague to be productive or not, on a quantitative assessment only. Please assign a "0" if you feel that the item does not deserve to be considered. A weight of "6" has been assigned to articles published as a starting point. The index is understood to have a fixed time limit.

1. Books published _____ per number
2. Monographs published (less than 100 pages) _____ per number
3. Articles published _____ per number
4. Books in press _____ per number
5. Monographs or articles in press _____ per number
6. Books in progress (any stage of development) _____ per number
7. Monographs or articles in progress _____ per number
8. Doctoral dissertations directed _____ per number
9. Doctoral dissertation committees _____ per number
10. Masters theses directed _____ per number
11. If manuscript reviewer of a publishing firm _____ per firm
12. If officer in a professional association _____ per office
13. If guest lecturer at conference _____ per appearance
14. If on editorial board of Journal _____ per board
15. If does consulting work _____ per project.

16. If at a learned society: gave paper ____ per number

on panel ____ per number

chairman ____ per number

17. Conferences attended ____ per number

18. Hours per week on meetings ____ 2 or less

____ 3 (average)

____ 4 or more

19. Teaching time (time allocated to teaching function; includes preparation, class time, marking, helping students)

If very high (over 45 hours per week) ____

If above average (about 35 hours per week) ____

If average (about 25 hours per week) ____

If below average (about 15 hours per week) ____

TABLE 8

RESULTS OF MINISURVEY: ACADEMICS AND TEACHERS COMBINED

(15 responses)

PRODUCTIVITY ASPECT	MEAN	STANDARD DEVIATION	STANDARD ERROR
books published	11.20	6.24	1.61
monographs published	8.00	2.61	.67
articles published	6.00	.00	.00
books in press	9.93	6.63	1.71
monographs or articles in press	7.33	2.89	.74
books in progress	4.06	2.40	.62
monographs or articles in progress	2.40	1.50	.38
doctoral dissertations directed	4.80	4.47	1.15
doctoral committees	2.00	1.51	.39
masters theses directed	2.80	2.24	.57
manuscript reviewer	1.73	1.33	.34
association officer	3.06	1.75	.45
guest lecturer	2.53	1.59	.41
editorial board	4.19	2.78	.71
consulting work	1.60	1.88	.48
learned society--gave paper	3.86	1.18	.30
learned society--on panel	2.00	1.00	.25
learned society--as chairman	1.46	1.30	.33
conferences attended	.66	.97	.25
meetings--less than three hrs. per week	.93	1.22	.31
meeting--three (average) hrs. per week	1.40	1.18	.30
meetings--more than three hrs. per week	2.13	1.50	.38
teaching time--very high (over 45 hrs. per week)	17.40	16.43	4.24
teaching time--above average (about 35 hrs. per week)	12.93	12.52	3.23
teaching time--average (about 25 hours per week)	8.93	11.40	2.94
teaching time--below average (about 15 hrs. per week)	3.40	8.74	2.25

TABLE 9

RESULTS OF MINISURVEY: ACADEMICS (9 responses)

PRODUCTIVITY ASPECT	MEAN	STANDARD DEVIATION	STAND. ERROR
books published	7.55	3.20	1.06
monographs published	7.11	2.26	.75
articles published	6.00	0.00	0.00
books in press	6.44	3.71	1.23
monographs or articles in press	6.77	2.94	.98
books in progress	3.11	1.45	.48
monographs or articles in progress	2.77	1.48	.49
doctoral dissertations directed	3.66	1.41	.47
doctoral committees	1.77	1.39	.46
masters theses directed	2.22	1.64	.54
manuscript reviewer	1.66	1.65	.55
association officer	3.22	1.92	.64
guest lecturer	2.44	1.33	.44
editorial board	4.22	2.48	.82
consulting work	1.77	2.04	.68
learned society--gave paper	4.00	1.32	.44
learned society--on panel	2.11	1.26	.42
learned society--as chairman	1.55	1.50	.50
conferences attended	.77	1.20	.40
meetings--less than three hrs. per week	1.22	1.39	.46
meetings--three(average) hrs. per week	1.55	1.23	.41
meetings--more than three hrs. per week	2.22	1.39	.46
teaching time--very high (over 45 hrs. per week)	5.99	3.35	1.11
teaching time--above average (about 35 hrs. per week)	4.66	2.34	.78
teaching time--average (about 25 hrs. per week)	2.77	2.10	.70
teaching time--below average (about 15 hrs. per week)	.88	2.52	.84

TABLE 10

RESULTS OF MINISURVEY: TEACHERS (6 responses)

PRODUCTIVITY ASPECT	MEAN	STANDARD DEVIATION	STAND. ERROR
books published	16.66	5.75	2.34
monographs published	9.33	2.73	1.11
articles published	6.00	0.00	0.00
books in press	15.16	6.82	2.78
monographs or articles in press	8.16	2.85	1.16
books in progress	5.50	2.94	1.20
monographs or articles in progress	1.83	1.47	.60
doctoral dissertations directed	6.49	6.86	2.80
doctoral committees	2.33	1.75	.71
masters theses directed	3.66	2.87	1.17
manuscript reviewer	1.83	.75	.30
association officer	2.83	1.60	.65
guest lecturer	2.66	2.06	.84
editorial board	4.16	3.43	1.40
consulting work	1.33	1.75	.71
learned society--gave paper	3.66	1.03	.42
learned society--on panel	1.83	.40	.16
learned society--as chairman	1.33	1.03	.42
conferences attended	.50	.54	.22
meetings--less than three hrs. per week	.50	.83	.34
meetings--three (average) hrs. per week	1.16	1.16	.47
meetings--more than three hrs. per week	2.00	1.78	.73
teaching time--very high (over 45 hrs. per week)	34.50	12.38	5.05
teaching time--above average (about 35 hrs. per week)	25.33	11.07	4.52
teaching time--average (about 25 hrs. per week)	18.16	13.65	5.57
teaching time--below average (about 15 hrs. per week)	7.16	13.24	5.40

DISCUSSION OF EXPLORATORY ANALYSIS RESULTS

An overview of the exploratory results indicates that the same patterns emerge as found in the planned results. The same key variables are present while those near the critical significance level for this study, 0.10 alfa level, tend to rise above and then fall below this critical level. In all the cases where the variables were significant, it was observed that the signs of the beta coefficients were retained.

Some mention should be made of the specific results of some of these analyses. In the group consensus-academic analyses, it was observed that the degree predictor emerged as a significant variable in both the multiple and stepwise regressions. The group consensus-teacher stepwise analysis showed disengagement as a significant predictor. The individual-academic and teacher combined analysis was notable for its lack of significant variables. The individual-academic analysis indicated disengagement as a significant predictor in miltiple regression and degree as a significant predictor in the stepwise regression. The final exploratory analysis, that of individual-teacher basis, registered travel fund availability as significant both in the stepwise and simple regression analyses.

The results from the simple regression analyses (from both original and exploratory analyses) indicate that as individual predictors operating without regard for any other variables, the number of student assistants, the orientation

towards teaching, and the presence of a doctorate all tend to account for a sizeable percentage of the productivity variance.

TABLE 11

EXPLORATORY ANALYSIS RESULTS: MULTIPLE REGRESSION FROM GROUP CONSENSUS AND ACADEMIC WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.3479

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 11.68

CONSTANT COEFFICIENT: 14.95 STANDARD ERROR: 40.47

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
aloofness	-7.78	4.10	3.59	0.05
production emphasis	6.68	2.98	5.01	0.02
thrust	-9.66	5.16	3.49	0.06
student assistants	3.70	0.87	17.82	0.000
degree	6.16	3.56	2.99	0.08

TABLE 12

EXPLORATORY ANALYSIS RESULTS: STEPWISE REGRESSION FROM GROUP CONSENSUS AND ACADEMIC WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.2951

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 11.28

CONSTANT COEFFICIENT: 5.41 STANDARD ERROR: 5.89

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	2.93	1.12	6.76	0.01
student assistants	3.53	0.74	22.57	0.000
teaching orientation	-5.07	2.14	5.59	0.01
degree	5.53	2.85	3.77	0.05

TABLE 13

EXPLORATORY ANALYSIS RESULTS: SIMPLE REGRESSION FROM GROUP CONSENSUS AND ACADEMIC WEIGHTINGS

PREDICTOR	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
esprit	0.03	-2.34	1.13	4.30	0.03
aloofness	0.02	1.82	1.06	2.94	0.08
production emphasis	0.05	3.39	1.28	7.02	0.009
student assistants	0.18	4.15	0.76	29.43	0.000
teaching orientation	0.06	-7.22	2.39	9.08	0.003
research orientation	0.01	3.89	2.42	2.57	0.10
degree	0.07	10.25	3.09	10.94	0.001

TABLE 14

EXPLORATORY ANALYSIS RESULTS: MULTIPLE REGRESSION FROM GROUP CONSENSUS AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.3592

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 10.03

CONSTANT COEFFICIENT: 35.49 STANDARD ERROR: 34.76

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
hindrance	2.84	1.68	2.83	0.09
intimacy	-5.93	2.86	4.27	0.03
thrust	-8.56	4.43	3.72	0.05
student assistants	3.42	0.75	20.63	0.000
teaching orientation	-5.64	2.53	4.94	0.02

TABLE 15

EXPLORATORY ANALYSIS RESULTS: STEPWISE REGRESSION FROM GROUP CONSENSUS AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.3103

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 9.71

CONSTANT COEFFICIENT: 54.08 STANDARD ERROR: 11.40

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
disengagement	-2.74	1.05	6.78	0.01
hindrance	2.75	0.91	9.09	0.003
intimacy	-6.24	1.38	20.19	0.000
student assistants	3.33	0.65	26.11	0.000
teaching orientation	-6.38	1.87	11.56	0.001

TABLE 16

EXPLORATORY ANALYSIS RESULTS: SIMPLE REGRESSION FROM GROUP CONSENSUS AND TEACHER WEIGHTINGS

PREDICTOR	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
hindrance	0.03	2.37	1.03	5.27	0.02
aloofness	0.03	1.83	0.91	3.98	0.04
production emphasis	0.02	2.16	1.12	3.69	0.05
initiating structure	0.02	1.95	1.08	3.23	0.07
student assistants	0.12	2.99	0.68	18.91	0.000
teaching orientation	0.05	-5.46	2.09	6.81	0.01

TABLE 17

EXPLORATORY ANALYSIS RESULTS: MULTIPLE REGRESSION FROM INDIVIDUAL RESPONSE AND COMBINED ACADEMIC AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.3314

F-PROB.: 0.001 STANDARD ERROR OF PRODUCTIVITY: 7.97

CONSTANT COEFFICIENT: 6.68 STANDARD ERROR: 14.31

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	1.28	0.66	3.78	0.05
student assistants	23.06	5.57	17.08	0.000
teaching orientation	-4.28	1.94	4.86	0.02

TABLE 18

EXPLORATORY ANALYSIS RESULTS: STEPWISE REGRESSION FROM INDIVIDUAL RESPONSE AND COMBINED ACADEMIC AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.2459

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 7.83

CONSTANT COEFFICIENT: 18.02 STANDARD ERROR: 2.21

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	0.84	0.47	3.16	0.07
student assistants	25.83	5.07	25.89	0.000
teaching orientation	-3.74	1.47	6.41	0.01

TABLE 19

EXPLORATORY ANALYSIS RESULTS: SIMPLE REGRESION FROM INDIVIDUAL RESPONSE AND COMBINED ACADEMIC AND TEACHER WEIGHTINGS

PREDICTOR	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	0.02	0.96	0.53	3.26	0.06
student assistants	0.18	28.06	5.16	29.49	0.000
teaching orientation	0.06	-4.78	1.61	8.76	0.004
travel funds	0.03	1.95	0.95	4.19	0.04
degree	0.04	5.40	2.12	6.47	0.01

TABLE 20

EXPLORATORY ANALYSIS RESULTS: MULTIPLE REGRESSION FROM INDIVIDUAL RESPONSE AND ACADEMIC WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.3314

F-PROB.: 0.001 STANDARD ERROR OF PRODUCTIVITY: 11.83

CONSTANT COEFFICIENT: -7.34 STANDARD ERROR: 21.23

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
disengagement	1.45	0.89	2.65	0.10
student assistants	33.69	8.27	16.57	0.00
teaching orientation	-5.83	2.88	4.10	0.04

TABLE 21

EXPLORATORY ANALYSIS RESULTS: STEPWISE REGRESSION FROM INDIVIDUAL RESPONSE AND ACADEMIC WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.2560

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 11.54

CONSTANT COEFFICIENT: 16.08 STANDARD ERROR: 3.12

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
student assistants	35.52	7.62	21.68	0.000
teaching orientation	-5.05	2.19	5.29	0.02
degree	6.31	2.90	4.74	0.02

TABLE 22

EXPLORATORY ANALYSIS RESULTS: SIMPLE REGRESSION FROM INDIVIDUAL RESPONSE AND ACADEMIC WEIGHTINGS

PREDICTORS	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	ERROR	RATIO	PROB.
disengagement	0.02	1.33	0.76	3.00	0.08
production emphasis	0.02	1.27	0.79	2.58	0.10
student assistants	0.18	41.56	7.67	29.35	0.000
teaching orientation	0.06	-7.22	2.39	9.08	0.003
research orientation	0.01	3.89	2.42	2.57	0.10
travel funds	0.10	2.27	1.42	2.54	0.10
degree	0.07	10.25	3.09	10.94	0.001

TABLE 23

EXPLORATORY ANALYSIS RESULTS: MULTIPLE REGRESSION FROM INDIVIDUAL RESPONSE AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.2716

F-PROB.: 0.02 STANDARD ERROR OF PRODUCTIVITY: 10.70

CONSTANT COEFFICIENT: 18.88 STANDARD ERROR: 19.20

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	1.59	0.88	3.24	0.07
thrust	-1.45	0.82	3.05	0.07
student assistants	24.75	7.48	10.93	0.001
teaching orientation	-5.13	2.60	3.88	0.04

TABLE 24

EXPLORATORY ANALYSIS RESULTS: STEPWISE REGRESSION FROM INDIVIDUAL RESPONSE AND TEACHER WEIGHTINGS

COEFFICIENT OF MULTIPLE DETERMINATION: 0.1975

F-PROB.: 0.000 STANDARD ERROR OF PRODUCTIVITY: 10.43

CONSTANT COEFFICIENT: 23.03 STANDARD ERROR: 3.82

PREDICTOR	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	1.08	0.63	2.94	0.08
student assistants	25.60	6.82	14.06	0.000
teaching orientation	-4.36	1.96	4.92	0.02
travel funds	1.87	1.14	2.69	0.09

TABLE 25

EXPLORATORY ANALYSIS RESULTS: SIMPLE REGRESSION FROM INDIVIDUAL RESPONSE AND TEACHER WEIGHTINGS

PREDICTOR	COEFF. MULT. DETERM.	TOTAL BETA COEFF.	STAND. ERROR	F RATIO	F PROB.
production emphasis	0.02	1.23	0.68	3.21	0.07
student assistants	0.12	29.82	6.88	18.76	0.000
teaching orientation	0.05	-5.46	2.09	6.81	0.01
travel funds	0.03	2.58	1.22	4.46	0.03