1-1-1971

The relationship between innovativeness and selected elements of group structure.

David Prytherch Crandall
University of Massachusetts Amherst

Follow this and additional works at: https://scholarworks.umass.edu/dissertations_1

THE RELATIONSHIP BETWEEN INNOVATIVENESS AND
SELECTED ELEMENTS OF GROUP STRUCTURE

A Dissertation Presented

By

David Prytherch Crandall

ii

THE RELATIONSHIP BETWEEN INNOVATIVENESS AND
SELECTED ELEMENTS OF GROUP STRUCTURE
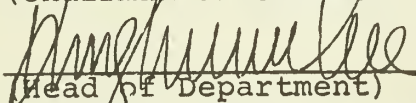
A Dissertation

By
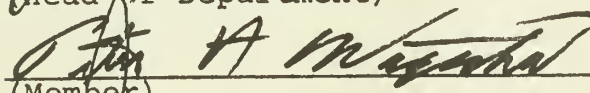
David Prytherch Crandall
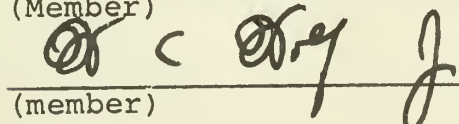
Approved as to style and content by:

_____
(Chairman of Committee)

_____
(Head of Department)

_____
(Member)

Kenneth H. Blanchard
_____
(Member)

_____
(member)

May 1971

iii

DEDICATION

To my loving wife, San, whose support and patience
during the last two years made it all possible.

exhilerations during my stay at UMass. Without them the
experience would have been just another stop on the way.
As it is, I am sad to see it end.

And, of course, San, who has given up so much so that
I can be happy.

The Relationship between Innovativeness

and Selected Elements of Group Structure

(May 1971)

David Prytherch Crandall

B.S., Union College

Ed.D., University of Massachusetts

Directed by: Dr. Robert L. Sinclair

Previous studies of the diffusion of innovations and
innovativeness have suffered from two major limitations.
First, most studies have focused on either the individual
as an independent adopter (eg. farmers or doctors) or have
considered situations in which diffusion between organiza-
tions was the locus of interest. Second, previous measures
of innovativeness have generally been restricted to a con-
sideration of how long ago the individual or organization
adopted a given innovation. The present study explored an
expanded definition of innovativeness combined with an
analysis of within-group diffusion of an innovation.

The purpose of this investigation was to answer the
general question: What is the relationship between selected
characteristics of intact teacher groups and their innov-
ativeness? The answer to this general question was sought
through the testing of fifteen main effect hypotheses. The
independent variables for those hypotheses having the indiv-
idual as the unit of analysis were age, education, teaching

income, non-teaching income, years of teaching(total), years of teaching(in a given school), number of advantages and disadvantages, perceived benefit to students, perceived student attitude toward the innovation, perceived decision-making power, norms-attitude toward innovators, and information level re new practices. The independent variables having the school as the unit of analysis were communication between early and late knowers, number of opinion leaders, prestige of opinion leaders, and number of isolates, minor cliques, and primary and secondary liasons.

Where the individual was the unit of analysis, multiple regression analysis was used to determine the importance of the independent variables as predictors of innovativeness. Four measures of innovativeness were used as dependent variables - time of awareness, time of adoption, innovation internalization, and self-perceived change orientation. Where the school was the unit of analysis, hypotheses were tested by logical conclusions from the obtained data.

The sample consisted of 130 staff members of six Massachusetts elementary schools, organized either K-5 or K-6. Group administration of a questionnaire took place in the schools between January 15 and February 15, 1971.

The support for the specific hypotheses was mixed. In no case were any of the independent variables as specified in the hypotheses significantly related to all four measures

of innovativeness employed. Twelve variables (or sub-variables) were significantly related to time of awareness. Only three variables (or sub-variables) were significantly related to time of adoption, the classic indicator of innovativeness. Six variables were significantly related to innovation internalization. Change orientation had eight variables significantly related to it.

An inspection of the communication network in the schools yielded very interesting findings. In all cases, either the principal or another member of the administrative staff was designated as the primary opinion leader. In the school which ranked first on innovation internalization and change orientation, the primary opinion leaders were the principal and assistant principal, both of whom enjoyed relatively high prestige. The communication structure had few "costly" structural features (eg. many isolates, minor cliques, and primary and secondary liasons). The congruence between the identity of the formal and informal leaders of the organization was not present to such a high degree in the other five schools.

The findings suggest that such additional measures of innovativeness as employed here offer more promise for use in the study of within-group diffusion than the classical measures employed heretofore. In addition, the central role of the principal in the elementary school as indicated by

his importance in the communication network of the school
has significant implications for change efforts in all
schools. Further, training programs for administrators
should take into consideration that successful management
of the communications within a school may be a major
determinant of the innovativeness of the teacher group.
Independent research including the same schools found that
the school deemed most innovative in the present study also
possessed an "ideal" learning environment as perceived by
the students.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

C H A P T E R   I

INTRODUCTION

Change is a fact of life in today's schools. Every day
teachers and administrators are called upon to alter their
methods in order to better serve their clients - the public.
Occasionally, they actually do, sometimes with success,
sometimes not. One might hope that this pressure would pro-
vide the impetus for a systematic investigation of how change
in schools occurs, how a particular innovation comes into
being, what causes it to take hold and spread, or wither and
die. As institutions concerned with the future of our coun-
try, we might expect that our schools would reflect America's
preeminent concern in matters vitally affecting its destiny.
Unfortunately, it is not at all clear that this is so.
Though it seems (Carlson 1965) that the time required for an
innovation to be adopted has been shortened considerably from
the fifty year lag cited in the Mort studies (1964), there
is little evidence that this speeding up is the result of
any systematic, comprehensive examination of what causes
innovations to diffuse. Rather, the phenomena is generally
attributed to the crisis engendered by the arrival of Sput-
nik, and the resultant limited (in scope) deployment of
talent and money coupled with a much improved communication
process. Once the pressure was removed, education returned
to its prior state, with only a few visible changes in its

practicioners way of viewing the world. Sputnik did not result in educators searching out a better understanding of change so as to be prepared in the future. A 'crisis' occured, was dealt with, and they returned to business as usual. Perhaps American education needs to be jolted by another Sputnik. Or perhaps several "sputniks" have appeared on the horizon, only to pass unseen by educators and others too busy looking in on themselves and their problems to recognize that they are concentrating on one small part of a larger problem.

Certainly the academic study of the diffusion of innovations is not enough to provide for tomorrow. Only when placed in the context of educational change (Miles 1964, Lin 1966b, 1968, McClelland 1968) does the real potential of such study become apparent. For if we know how, and hopefully why, an innovation spreads from its introduction to its adoption (or rejection), we can gain valuable knowledge upon which to base our decisions and strategies for the future.

Educational organizations are extremely complex entities. The factors affecting their responsiveness to change are myriad. Of the factors generally viewed as important, many are not easily manipulable, given the reality of today's school organization. Thus, age of staff is a factor which may be uncontrollable due to tenure regulations.

Similarly, salary has some very finite boundaries, and progress is generally based on time in grade rather than excellence of performance. Hiring practices which might seek out staff who are both new to the profession and well-educated are still restricted by the number of available positions and the difficulty of replacing ineffective, but tenured, staff. Additional funds for materials and supplies are also becoming increasingly scarce. As a result of the difficulty of altering these factors, we must consider new variables in our attempt to gain a clearer view of what the diffusion process is within formal organizations. This study explores some variables that offer positive implications for future action. Although the study will include such traditional variables as age and education, additional variables which offer more likelihood of being altered in the course of change efforts will be operationalized. A primary focus will be on the communication network within the school, aspects of which are possible starting points for change efforts within a given school.

Purpose of the Study

The purpose of this exploratory study is to describe selected characteristics of teachers and the communication structure within teacher groups in relation to innovativeness. The study examines existing teacher groups in selected

elementary schools in the hopes of discovering implications for future educational change efforts. The study attempts to clarify some of the variables underlying the successful diffusion of a particular innovation in selected schools. In doing so, a major portion of the study will concentrate on the "within school" communication network among teachers and its relation to various indicators of innovativeness. Finally, the study will yield recommendations for further research in the areas of intra-organization communication and diffusion of innovations within intact groups.

Definitions

As has been noted, this is a study attempting to derive implications for educational change. As used here, educational change means planned, directed change as opposed to random occurance of new events (Rogers 1968, Bennis, Benne, and Chin 1961, 1969, Lippitt, Watson, and Westley 1958).

Diffusion is defined as a process by which an innovation is communicated via certain channels to members of a social system who adopt it over a period of time (Rogers 1968).

A primary focus will be the structural analysis of teacher groups within selected schools based on information about their communication behavior. Structural analysis refers to the examination of individual teacher responses to

a sociometric item requesting nomination of the persons from whom the respondent seeks advice on educational practice. First, a sociogram depicting the communication network within the specified group is constructed. Then, the following selected characteristics of group structure are identified (adapted from Lin 1968):

1. Isolate - the teacher who neither nominated nor was nominated by any other teacher.

2. Minor clique - a subgroup of teachers who had no connection with the major clique (the major clique constituting the largest number of teachers who interacted with one another).

3. Opinion leader - a teacher who was nominated by more than 10% of his fellow teachers.

4. Primary liason - a teacher whose absence from the group structure would break one connected group into at least two separated subgroups, each consisting of at least two teachers.

5. Secondary liason - a teacher whose absence, paired with the absence of another teacher, would break one connected group into at least two separated subgroups, each consisting of at least two teachers.

6. Influence domain - the number of teachers to whom he (a given teacher) provided advice upon request or whom he influenced indirectly.

7. Centrality - the sum of all chains in the influence domain divided by the influence domain.

8. Prestige - the influence domain divided by the product of his (a given teacher) centrality and the number of other teachers (N-1).

In addition, the sociometric data are combined with the individual responses stating when first awareness of the innovation occured. Combining this information gives an

indication of the extent and direction of communication between early knowers and late knowers within the group as follows:

1. Upward communication - a teacher's nomination of another teacher who had become aware of the innovation earlier than himself.

2. Downward communication - one teacher's nomination of another teacher who had become aware of the innovation later than he had himself.

3. Horizontal communication - one teacher's nomination of another teacher who had become aware of the innovation at the same time as he had.

Further, the communication behavior within each group will be related to its innovativeness. The following indicators of innovativeness are investigated:

1. Time of adoption - relatively early adoption has been generally viewed as a "behavioral" indicator of innovativeness.

2. Time of awareness - awareness of and/or knowledge of an innovation is generally believed to be a prerequisite to adoption.

3. Innovation internalization - defined as the extent to which a teacher perceives an innovation as relevant and valuable to his role performance in the school (Lin 1966).

4. Change orientation - defined as the teacher's general attitude toward change (Lin 1968).

Significance of the Study

Today's schools must be viewed as arenas of constant change, some of it planned, some spontaneous. A primary goal of contemporary administrators must be the effective

management of such change. Study of the diffusion process within organizations can tell us a great deal about how contemplated changes can be most effectively managed.

Lin (1968) has shown that the diffusion tradition has distinct limitations as heretofore applied to educational organizations. Prior studies have generally focused on individuals acting as independent agents (e.g., farmers and doctors). When organizations have been examined, the usual concern has been on diffusion between organizations (cf. Carlson 1965). Thus, little is known about the process that takes place within organizations which have adopted new practices. As bureaucracies, schools are likely to incorporate many changes with which their staffs have little recourse but to comply. As a first step toward long-term change this may be necessary, but simple compliance will certainly not insure successful functional utilization of a particular innovation. Rather, ways must be discovered to enhance the likelihood that an organization's members will be receptive to change and will understand and adopt needed innovations. A parallel task is to perfect measures of such commitment. The present study attempts to overcome the limitations of most prior studies and focus on those features within selected schools which are likely to have influenced the adoption of a particular innovation. The development of more comprehensive strategies for the introduction of

innovations in the future will be facilitated by gaining a
clearer view of the diffusion process within an organization
and the factors which affected the progress of a given inno-
vation. This study is concerned with the internal communi-
cation dynamics of schools rather than the transmission of
ideas between schools. The focus is on what makes a particu-
lar school tick, what contributes to its being innovative or
not. How a given school relates to other schools in its
district or region is not the concern of the present study.
Thus, the emphasis of this study is on diffusion within
organizations. The possible implications of such studies
for the training and retraining of principals as managers of
innovative institutions is a major feature of the current
study.

Schools are unique in that the vast majority of their
primary activity - "education" - takes place behind closed
doors, making it extremely difficult for the researcher, or
anyone for that matter, to gather truly behavioral data
reflecting the use of a particular innovation. The limita-
tions of self-reports in such settings are well-known, but
no simple alternative has been developed as yet. In the
past, diffusion studies have tended to focus on time of
adoption as a behavioral indicator of innovativeness. Lin
(1968) has shown the inappropriateness of this variable in
many educational contexts. If an individual has no

meaningful influence over the decision to adopt a particular innovation, that is, if the school is in fact the locus of the adoption decision, then asking that individual when he adopted the innovation is meaningless - he adopted it when the school adopted it. If, on the other hand, the individual perceives that he has a real choice and in fact is the locus of adoption, then time of adoption can be a meaningful variable. In this latter case, an individual who adopts an innovation relatively early compared with his peers is considered to be more innovative. This concept of early adoption as an indicator of innovativeness is the dominant concept in most previous studies. The present study expands upon this rather limited definition of innovativeness. Nonetheless, the present study attempts to determine the respondent's perception of his decision-making power and use time of adoption as a variable where appropriate.

The foregoing limitation led Lin to create and utilize other indicators of innovativeness in his study, namely innovation internalization and change orientation, previously defined. The present study incorporates these variables, but in a different level of educational institution from that investigated by Lin. Whereas his study focused on high schools, the present study shifts the inquiry to elementary schools. By so doing, it is hoped that the utility of the methods employed by Lin will be advanced.

If the results of this study support Lin's findings at a high school level, we will have made progress on establishing some common areas of inquiry that cut across organizational boundaries. If the results do not provide such support, we will at least have gained knowledge which will be helpful in circumscribing the area of inquiry that is amenable to research.

Review of the Literature

Researchers have given little attention to the specific problem posed in this study. However, there are elements contained within certain earlier studies which bear some relation to the problem at hand and will therefore be cited.

The studies included below touched on certain aspects of innovativeness and diffusion of innovations which provided general direction for the present study. In particular, the cited findings demonstrated the importance of relationships between individuals in affecting the diffusion of an innovation. The hypotheses for the present study, which focus on aspects of such crucial factors, are a continuation, and hopefully an advancement, of this line of research.

Katz (1961) made a comparison between two studies which attempted to deal with the 'social itinerary' of an innovation. One was the Ryan and Gross (1943) study of the diffusion of hybrid corn in two Iowa communities. The other

concerned doctors in four communities and their response to the availability of a new miracle drug. Both of these studies plotted the diffusion of the innovation. The data from the hybrid corn study led its authors to infer "that interpersonal influence would appear to account for the observed pattern of spread". The drug study supported a similar conclusion made more powerful as it was related to whether a doctor was "integrated" or "isolated", with the interpersonal influence being most important among the integrated doctors.

Carlson (1965) conducted a study involving superintendents in Allegheny County, Pennsylvania and West Virginia which focused on factors influencing their adoption of Modern Math, Programmed Instruction, Team Teaching, Language Labs, Foreign Language, and Accelerated Programs. He found a direct relationship between number of friendship choices, perception of amount of interaction with colleagues, perception of innovativeness, and rate of acceptance of innovations. The superintendent's position in the status structure was also directly related to his acceptance rate.

Mort (1964), in a review of approximately 200 studies of adaptability of public school systems done by the Institute of Administrative Research at Columbia, pointed up the importance of system norms in the acceptance of new practices. "A community that is slow to adopt one innovation

tends to be slow to adopt others. A pioneer in one area tends to be a pioneer in other areas."

Rogers (1962) reports on several studies which support the notion that "social system norms on innovativeness seem to determine, at least in part, the innovativeness of opinion leaders". Thus an opinion leader in a social system with modern norms would be more innovative than his counterpart in a system with traditional norms.

Rogers (1968) sets the stage for the current study when he states "that in spite of the volume of research attention devoted to the diffusion of innovations, relatively little emphasis has been placed upon diffusion within organizational structures". Further, he calls "for relational analysis, in which the unit of analysis is a dyadic pair, a sociometric chain, or cliques or subsystems as indicated by a matrix of communication relationships". Past studies have overemphasized the individual rather than the communication relationship as the unit of analysis. He goes on to state the need, "procedurally, for the study of structural effects as system variables in the diffusion of innovations within educational organizations. Structural effects are the consequences of the system's social structure in which one is a member on his behavior." The specific structural effects of concern to the present study are those related to the communication network and which have been defined previously.

Lin (1966) investigated the diffusion of flexible scheduling in three Michigan high schools. His study, the basis for the current investigation, introduced two variables, innovation internalization (previously unused) and self-perceived change orientation, which are also included in the current study. He concluded his study of three innovative secondary schools by calling for its replication in "different types of educational institutions (e.g., non-innovative secondary schools, elementary schools, colleges)" which by the nature of their basic organizational structure may yield new information.

Chesler (1966) explored the relationship between social structure and innovation in sixteen elementary schools. As a measure of innovation, or innovativeness, he used both a simple yes-no self-report to a question regarding use of new practices, and a self-report asking teachers how many of twelve innovative practices presented they had tried or were trying. His study indicated positive relationships between one or more of the dependent variable measures and such aspects of teacher relations as the perception that the staff is cohesive, being nominated as "a high communicant, as highly influential, and as highly enthusiastic about new approaches". Further, educational level, teaching experience, and felt influence were positively related to innovativeness.

In a subsequent (1968) reanalysis of the original data, Lin explored communication patterns and elements of group structure such as number of opinion leaders, cliques, isolates, primary and secondary liasons, etc. He found a direct relationship between these elements and the innovativeness of a school as indicated by innovation awareness dates and innovation internalization scores.

In his main study (1966) of the diffusion of flexible scheduling in three Michigan high schools, Lin found a serious problem related to the meaningfulness of individual adoption rate as an indicator of innovativeness in formal organizations. Most (significant) innovations adopted within schools require an enabling or legitimizing decision by the institution prior to any single individual's adoption. When the organization is the functional unit of adoption, all teachers, in effect, adopt such innovations (e.g., flexible scheduling) at the same time. In these cases, individual adoption rate as an indicator of innovativeness is a meaningless variable. Determination of the appropriateness of inclusion of this variable would depend on the decision-making process in operation in School X for Innovation Y at Time Z.

The above studies serve as the foundation for the hypotheses explored in this study. Each included a concept, e.g., interpersonal communication, norms, structural effects,

innovativeness, considered central in the present study. Elaboration upon this basic foundation will be made as the individual hypotheses are presented in the section below.

Presentation of Hypotheses

Teacher characteristics. Certain demographic characteristics of teachers would seem important to include, despite their relative invulnerability to manipulation. Lin (1968) found no differences in three Michigan high schools on sex, educational level, or salary, but one school's teachers tended to be older. Chesler (1966) found no differences on sex or age, but did find differences on educational level and teaching experience. Studies cited by Rogers (1962) are also mixed. It is clear that the relationship of such factors to innovativeness varies from one situation to another. In each case, their possible relationship should be examined. Thus,

Hypothesis 1.   Faculty who are younger will be more innovative.

Hypothesis 2.   Faculty who have more education will be more innovative.

Hypothesis 3.   Faculty who earn more will be more innovative.

Hypothesis 4.   Faculty who have taught fewer years in total will be more innovative.

Hypothesis 5.   Faculty who have taught more years in a given school will be more innovative.

Attributes of the innovation. Intuition would suggest that as regards a particular innovation, teachers seeing many advantages would utilize it more readily than teachers who see many disadvantages, thereby making the former more innovative when adoption is the criterion. Lin (1966b) found support for this common sense notion and further uncovered an even more important variable. His study indicated that teachers' perceptions of the benefits to their students of a particular innovation were significantly related to innovativeness. If this relationship is present in a high school setting, where the relatively large number of students a given teacher deals with could adversely affect his concern for their feelings, it is certainly likely to be present in an elementary school which is inherently more cohesive. Thus,

Hypothesis 6. Faculty who perceive an innovation's advantages as outweighing its disadvantages will be more innovative.

Hypothesis 7. Faculty who perceive an innovation as benefiting their students will be more innovative.

Hypothesis 8. Faculty who perceive an innovation as being received enthusiastically by their students will be more innovative.

Group norms. The classic studies of group decision-making (Lewin 1947, Pelz 1958) point up the importance of this factor in behavior within an organization. Lin's (1966b) study also directly addresses the matter of perceived

decision-making power as a critical factor in explaining innovativeness. Thus,

> Hypothesis 9. Faculty who perceive that they have greater decision-making power over the adoption of an innovation will be more innovative.

Rogers (1962) cites several studies indicating the relationship between a social system's norms and the innovativeness of its members. As with decision-making, the norms are as seen by the individual respondent. What he thinks it is, it is insofar as any effect on his behavior is concerned. As we are interested in "within school" factors, the attitude expressed by its members toward those who are the first to adopt new practices is an important variable. Thus,

> Hypothesis 10. Faculty who perceive the norms as favoring innovators will be more innovative.

Information level. No system can expand to its ultimate potential without a continual input of new information. Indeed, diffusion research is predicated on the assumption that awareness precedes adoption. Rogers (1962) cites numerous studies supporting this concept. It seems logical then, that there would be a relationship between information level and innovativeness. Thus,

> Hypothesis 11. Faculty who indicate a greater awareness of new practices will be more innovative.

It follows that simple awareness of new practices by a

number of isolated teachers will not result in much forward
movement. Without communication, innovation is unlikely to
occur. Lin (1968) found a relationship between innovative-
ness and the extent of the communication between teachers.
Thus,

> Hypothesis 12.   Schools which have a high degree of
> communication between early and late
> knowers will be more innovative.

Group structure. The use of sociometric techniques has
a rather extensive history which will not be reiterated here
(see Lindzey and Borgatta's excellent chapter, "Sociometric
Measurement", Handbook of Social Psychology, Vol. 1, pp. 405-
448). Coleman (1964) has addressed himself to the measure-
ment of structural characteristics, as have others (Flament
1963, Ross and Harary 1952). Lin (1968) operationalizes the
responses to a sociometric item, in terms previously defined,
and shows that factors such as number of opinion leaders,
isolates, etc. are related to the innovativeness of an organi-
zation. From this work we may say,

> Hypothesis 13.   Schools which have many opinion leaders
> will be more innovative.
>
> Hypothesis 14.   Schools where the opinion leaders enjoy
> greater prestige will be more innova-
> tive.
>
> Hypothesis 15.   Schools which have fewer isolates,
> minor cliques, and primary and secon-
> dary liasons will be more innovative.

The approach to the present study then is to gather

information about selected variables such as attributes of

an innovation, characteristics of individual teachers, and
aspects of group structure which may be related to the inno-
vativeness of teachers individually and as a group. The
study is an attempt to continue a line of research focusing
on diffusion of innovations within organizations. The chap-
ters which follow present the methodology employed, the
findings of the study, and the implications for future ac-
tion and research.

C H A P T E R   I I

RESEARCH DESIGN AND METHODOLOGY

This chapter presents first the methods used to select a population sample and a particular innovation to serve as the vehicle for the data collection. The innovation chosen is discussed, followed by a presentation of the dependent variables and their data sources. The independent variables selected for inclusion are then presented along with their data sources. Lastly, the data collection plan is described followed by citations of specific incidents of interest which occured in the course of the data collection itself.

Sample Selection

The empirical testing of the hypotheses was operationalized through a field study in six schools. The unit of analysis for Hypotheses 1 - 11 was the teacher in the elementary school. Hypotheses 12 - 15 utilized the school as the unit of analysis.

The sampled elementary schools in Massachusetts were selected from a group of thirty-two schools who had responded positively to a letter sent to over fifty elementary schools which solicited their participation in a research study. The schools were selected on the basis of the following considerations:

1. Membership in the Network of Innovative Schools: All Massachusetts schools solicited initially and those subsequently selected for inclusion in this study were members of the Network of Innovative Schools, a statewide federation of schools whose goal is improved education through innovation. As part of their participation in the Network, schools had been asked to provide information relative to their utilization of innovative practices. Inspection of this information provided a means of selecting a particular innovation to serve as the vehicle for determining innovativeness and identifying those schools who had adopted it.

2. Adoption of the innovation: The schools selected must have officially adopted the designated innovation. Previous research has utilized various ways of narrowing the field of inquiry in order to assess innovativeness. Lin (1966a, 1966b, 1968) selected one innovation, flexible scheduling, which by its nature impinged on every teacher in the school. Christiansen and Taylor (1966) compiled a list of twenty-eight innovations which judges had rated as being available for adoption by teachers during the five years preceding the study. The number they adopted compared with the number available formed the basis for a formula which yielded an innovativeness score. Wolf and Fiorino (undated), in a study of diffusion strategies affecting a national sample, used open-ended interview questions which were tallied

to assess an individual's innovativeness. The coding of
this raw data alone was a gigantic task. The present author
ran a pilot test of a questionnaire for the proposed study
which incorporated the open-ended mode utilized by Wolf and
Fiorino. Inspection of results indicated that this was not
a promising format for questionnaires as the inability to
ask followup questions resulted in incomplete data. The
method used by Christiansen and Taylor, while it certainly
deals with the individual as the functional unit of adoption,
restricts the inquiry to innovations such as the use of
colored chalk, bulletin boards, and individual student fol-
ders which seem insignificant in their impact, when compared
with such new practices as flexible scheduling, differenti-
ated staffing, non-grading, team teaching, and so on.

Therefore, this study incorporates the method utilized
by Lin. The criteria employed in the selection of a single
innovation were: (1) it must have been adopted within the
last two years and, (2) by its nature it could affect the
entire teaching staff.

3. Size of sampled population: the total number of
teachers sampled should be a minimum of 100 in order to in-
sure statistical stability.

4. School organization: Only schools organized either
K - 5 or K - 6 were included. Schools covering a full range
of grades were deemed more desirable as they were more likely

to include an adequate number of teachers.

The Innovation Investigated

As has been noted, the innovation selected had to meet certain criteria. It must have been adopted within the past two years by schools which had a combined total population of at least 100 teachers. It must be an innovation which could affect the entire teaching staff -- one which potentially would have some organizational impact. An inspection of the information provided by the schools who had agreed to participate in this research study revealed few innovations which were likely to be similar from one school to the next. After evaluation of the available information, team teaching was chosen as the innovation which met the criteria and could serve as the vehicle for operationalizing the measures of innovativeness.

Team teaching has many definitions (Chamberlin 1969, Shaplin and Olds 1964, Beggs 1964, Goodlad and Anderson 1963). For the purposes of this study, team teaching was defined as:

> an arrangement whereby two or more teachers,
> with or without teacher aides, cooperatively plan,
> instruct and evaluate one or more class groups.
> This activity takes place in an appropriate in-
> structional space and given length of time, so
> as to take advantage of the special competencies
> of the team members.

The Dependent Variables

Innovativeness is measured in four different ways in the present study. It was first assessed by the response to the question:

"When did you first hear about team teaching?
(as best you can recall)

(month) _____ (year) _____ "

This yielded a time of awareness for each respondent.

Next we asked:

"Have you used team teaching yourself in this school?
When did you first use it? (as best you can recall)

(month) _____ (year) _____ "

The response to this question provides the classical dependent variable in diffusion research -- time of adoption.

Two four-item scales were used as additional indicators of innovativeness. The first of these contained five categorical response choices as follows:

Team teaching could constitute an improvement in educational practices in any school.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

I think team teaching represents an improvement in educational practices at my school.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

I think team teaching is unnecessary in our educational system.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

To me, team teaching is one of the worst things to come into our educational system.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

Transforming all responses to a positive direction and summing them produces an innovation internalization score for each respondent. This score is indicative of "the extent to which a teacher perceives the innovation or change as relevant to his role performance in the organization". (Lin 1966a)

The second four-item scale contained the following:

Personally, I feel I can adjust to changes easily.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

If we want to maintain a healthy and stable educational system, we must keep it the way it is and resist the temptations to change.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

Most changes introduced in the last ten years have contributed very little to improved education in our schools.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

I really believe we could have done a much better job or at least done just as well if things hadn't changed so much in our schools.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

Transformed in the same manner as the preceding scale, the sum of these responses produces a self-perceived change orientation score. This score is an indication of the individual's general pre-disposition toward change and innovations (Lin 1966a).

Each of the above dependent variables is treated separately in the testing of each of the hypotheses. Time of adoption is included only if the majority of teachers report that the decision to adopt the innovation was theirs alone or theirs after the organization made the enabling decision.

The Independent Variables

For each of the independent variables, one or more questionnaire items were constructed to operationalize the

hypotheses. These variables and their data sources are presented in Table 1.

Data Collection Plan

Information was gathered from the teachers in six sampled schools (designated as Schools 1, 2, 3, 4, 5, 6). The general procedure was as follows:

The author and/or a research associate arrived at the school at an agreed upon hour on the designated date. School 1 was visited on a Tuesday, Schools 2, 3, and 4 on a Thursday, Schools 5 and 6 on a Wednesday. The tests were administered in the afternoon in all schools except School 4, where a morning meeting was used. Each session lasted about an hour.

The data collection was part of a larger effort involving the collection of student data from the fifth and/or sixth grades. As a result, the researchers generally were in the building for most of the day. This provided an opportunity to be seen by the teachers, chat with the principal about the school and the use of the innovation, and get a feel for the school.

At the time scheduled, the teachers gathered in the teachers' room, library, or conference room. A notice had been distributed previously explaining why they were being asked to stay. The researcher introduced himself, provided

Table 1

SUMMARY OF INDEPENDENT VARIABLES AND THEIR DATA SOURCES*

Independent variable	Dependent variable	Data source (questionnaire item)
H1. Age	Innovativeness	109. What is your age? 1. 20-29 2. 30-39 3. 40-49 4. 50-59 5. 60 or over
H2. Education	Innovativeness	114. Educational background: 1. 1-3 years college 2. Bachelor's degree 3. Master's degree 4. Master's degree + ____ credits 5. C.A.G.S. or doctorate
H3A. Teaching income	Innovativeness	112. What is your current salary level? 1. $6800-7800 2. 7900-9100 3. 9200-10400 4. 10500-11700 5. 11800 or more

Table 1 (cont.)

	Dependent variable	Data source (questionnaire item)
Independent variable		
H3B. Non-teaching income	Innovativeness 113.	How much over and above your teaching salary did you earn from other sources last year?
		1. none
		2. less than $500
		3. $500-1500
		4. $1600-2500
		5. $2600 or more
H4. Years of teaching (total)	Innovativeness 110.	How many years have you been teaching in total?
		1. less than 3
		2. 3-5
		3. 6-10
		4. 11-15
		5. 16 or more
H5. Years of teaching (in a given school)	Innovativeness 111.	How many years have you been teaching at this school?
		1. less than 1
		2. 1-2
		3. 3-5
		4. 6-10
		5. 11 or more

Table 1 (cont.)

Independent variable	Dependent variable	Data source (questionnaire item)
H6A. Number of disadvantages	Innovativeness	What are the disadvantages that you thought team teaching would bring into the schools?
		90. How many disadvantages have you listed above? 1. one 2. two 3. three 4. four 5. five or more
H6B. Number of advantages	Innovativeness	What are the advantages that you thought team teaching would bring into the school?
		91. How many advantages have you listed above? 1. one 2. two

Table 1 (cont.)

Independent variable	Dependent variable	Data source (questionnaire item)
H6B. (continued)		91. (continued)

		3. three
		  4. four
		  5. five or more

H7. Perceived benefit to students	Innovativeness	86. My personal view regarding the use of team teaching is that the students....

		1. benefit greatly
		  2. benefit somewhat
		  3. not sure
		  4. do not benefit much
		  5. do not benefit at all

H8. Perceived student attitude toward the innovation	Innovativeness	87. Since we began using team teaching, my student's attitude toward it has been, on the whole,

		1. extremely enthusiastic
		  2. quite enthusiastic
		  3. so, so
		  4. not very enthusiastic
		  5. not at all enthusiastic

Table 1 (cont.)

Independent variable	Dependent variable	Data source (questionnaire item)
H9. Decision-making power	Innovativeness	106. Regarding the decision to adopt team teaching in your school, do you feel it was: 1. your personal decision 2. a decision upon which you had no influence but you had the choice of adopting it or not 3. a decision by consensus but you had the option of adopting it or not 4. a decision by consensus but you were required to adopt it 5. a decision made for you and you were required to adopt it or other (please specify) _____
H10. Norms-attitude toward innovators	Innovativeness	97. In your opinion, what do people in your school think of the individuals who are the first to adopt new educational practices? 1. viewed very favorably 2. viewed somewhat favorably 3. don't care one way or the other 4. viewed somewhat unfavorably 5. viewed very unfavorably

Table 1 (cont.)

Independent variable	Dependent variable	Data source (questionnaire item)
H11. Information level re new practices	Innovativeness	98. Which of the following topics have you heard about and/or discussed with other people in your school during the last six months? (mark as many as appropriate) 1. use of TV in classrooms 2. programmed learning 3. instructional materials center 4. non-graded school 5. integrated day/Leicestershire model 99. Same as #98 above. 1. ESS Science 2. schedule modifications 3. language laboratory 4. differentiated staffing 5. humanistic education (for example, magic circles)
H12. Communication between early and late knowers	Innovativeness	Combination of awareness date and sociometric item (see Appendix C).

Table 1 (cont.)

Independent variable	Dependent variable	Data source (questionnaire item)
H13. Number of opinion leaders	Innovativeness	Please indicate by name (for example, John Jones) up to three colleagues in your school whose advice you most frequently seek on problems related to educational practice.
H14. Prestige of the opinion leaders	Innovativeness	
H15. Number of isolates, minor cliques, and primary and secondary liasons	Innovativeness	

____ I generally don't seek advice

or

____ I generally seek advice, not from my colleagues here, but from ____

* The dependent variables in all cases are the four measures of innovativeness whose data sources are described in pp.24-26 and hereafter referred to as Innovativeness$_1$ (time of awareness), Innovativeness$_2$ (time of adoption), Innovativeness$_3$ (innovation internalization), and Innovativeness$_4$ (change orientation).

a brief overview of the purpose of the study and explained the mechanics of answering the questionnaires. Digitek answer sheets were used by the respondents to record their answers.

A written introduction to the questionnaire used for this study, as well as verbal comments made at the beginning of each session, stressed the confidentiality of the data. However, the respondents were asked to include their names for purposes of identification and to facilitate analysis of the sociometric item. As they completed the question- naire, respondents were asked if they had remembered to include their name. If not, they were asked to do so, and the explanation repeated. If they refused to fill in their name, that part of the analysis was incomplete.

After the questionnaires and pencils were passed out, the researcher reminded them that they were to respond indi- vidually and asked if anyone had further questions. He then stood aside ready to help if the need arose.

Group administration was chosen for several reasons. First, for the data to be most meaningful, as close to 100% of the staff as possible must be included. An attempt to utilize a mail return in the pilot survey yielded a response of approximately 55%, even after followup. Second, a cap- tive situation produces maximum control over the situation.

Third, it saves time for both teachers and the author.
Fourth, it is economical.

Some specific incidents that occured in the course of
data collection might be of interest to the reader.

In School 1, the questionnaires were completed during
a regular staff meeting. The first fifty minutes of the
meeting were devoted to a discussion of the upcoming teacher
contract. The discussion became rather pointed at times,
and an obvious disagreement on fundamental questions of
teacher professionalism, etc. was evident. There were 23
teachers in the school, and 20 completed the questionnaire
on the day of the visit.

In School 2, there had been a serious breakdown in com-
munication between the administration and the faculty regar-
ding the visit. The staff had simply been told to report to
the teachers' room at the end of the day. No explanation of
any sort had been distributed in advance. In this school,
all the arrangements had been handled by the Assistant Prin-
cipal. The situation was unique also in that the staff were
housed in two separate buildings on a common site. One buil-
ding was an older building with self-contained classrooms,
the other was a new open-space building. Teachers worked in
only one building, but had a common administrative team,
housed in the new building. There were 29 teachers in the
two buildings, 24 completed the questionnaire.

Teachers in School 2 exhibited extreme resistance to including their names on the instruments. The vast majority flatly refused, despite an extended explanation of the reasons why it was important to the research. Four teachers stayed for over an hour discussing the question of anonymity with the author. There seemed to be a great deal of fear, much of it openly admitted by the teachers. That they had not been consulted on whether they wanted to participate in the study seemed to have precipitated their specific response, although such lack of consultation seemed the norm in the school.

The author made a followup request directly to a teacher representative several days later suggesting an alternate method of preserving anonymity but still providing the needed data. This request was rejected by the teachers.

In School 4, the teachers did not have enough time in their morning staff meeting to complete the questionnaire. They were asked to complete them during the day and/or mail them back. There were 34 teachers in the school, questionnaires were returned by 33.

School 5 was a parochial school. None of the teachers were receiving salaries comparable to the public schools.

All of the schools were visited between January 15, 1971 and February 15, 1971.

The data thus collected was checked for completeness

and transferred to IBM cards as part of the preparation for analysis. The actual analysis and the findings which resulted are presented in the following chapter.

C H A P T E R   I I I
FINDINGS

The analysis of data in this study utilized both simple description and multivariate design. The strategy was two-fold. First, where the nature of the data precluded complex statistical analyses, description of the relationships was employed. Second, for those hypotheses which allowed it, a multiple regression model was utilized to determine the rela-tionships. independent of one another, of those variables specified in Hypotheses 1 - 11 to the four indicators of inno-vativeness selected as dependent variables. In all these cases the effect of school was controlled. The analysis in-volved the development of regression equations and corres-ponding beta weights for each of the independent variables. The significance of these beta weights was determined by testing the null hypothesis that they were not significantly different from zero. The research hypothesis was that the observed difference between the beta weight and zero had a low probability of occuring by chance. The alpha (probabi-lity) level for rejecting the null hypothesis was set at .05 for all tests.

Sample Description

The characteristics of the teachers in the six schools

are presented in Table 2. As can be seen, there was no difference other than sampling error expectation for position ($X^2 = 15.05$), sex ($X^2 = 6.35$), age ($X^2 = 35.09$), or education level ($X^2 = 25.76$) among the six schools. There were significant differences among the schools for total years in teaching ($X^2 = 49.64$; $p < .01$), where Schools 1 and 5 had teachers with longer experience than the other four schools. Similarly, there were differences among the schools for years of teaching in the given school ($X^2 = 71.74$; $p < .01$), where School 6 teachers had been employed by their school a shorter time than had the teachers in the other schools. There were significant differences for teaching income ($X^2 = 75.12$; $p < .01$), where Schools 3 and 5 teachers reported lower salaries than those reported by teachers in the other four schools. As has been noted previously, these differences may be partially explained by the fact that teachers in School 5 are all religious order members receiving subsistence level salaries. Interestingly, differences among the schools for non-teaching income ($X^2 = 40.89$; $p < .05$) were also evident, with the teachers in School 6 reporting more additional income than the other five schools.

The Innovation Investigated

Team teaching was the innovation used as the vehicle

Table 2

CHARACTERISTICS OF RESPONDENTS IN THE SIX SCHOOLS

	School 1 N = 23	School 2 N = 24	School 3 N = 24	School 4 N = 33	School 5 N = 9	School 6 N = 17
A. Position						
Full-time teacher	78.26%	79.17%	91.67%	75.76%	100.00%	82.35%
Part-time teacher	8.70%	4.17%	---	3.03%	---	---
Special teacher	8.70%	8.33%	4.17%	9.09%	---	17.65%
Teacher aide	---	---	---	---	---	---
Support staff	4.35%	---	---	3.03%	---	---
No response	---	8.33%	4.17%	9.09%	---	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
B. Sex						
Female	91.30%	91.67%	79.17%	78.79%	100.00%	88.24%
Male	8.70%	8.33%	16.67%	18.18%	---	11.76%
No response	---	---	4.17%	3.03%	---	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
C. Age						
20 - 29	21.74%	33.33%	62.50%	45.45%	11.11%	64.71%
30 - 39	21.74%	37.50%	20.83%	21.21%	66.67%	11.76%
40 - 49	39.13%	8.33%	12.50%	15.15%	11.11%	11.76%
50 - 59	8.70%	8.33%	---	9.09%	11.11%	11.76%
60 or over	8.70%	8.33%	---	6.06%	---	---
No response	---	4.17%	4.17%	3.03%	---	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2 (cont.)

	School 1 N = 23	School 2 N = 24	School 3 N = 24	School 4 N = 33	School 5 N = 9	School 6 N = 17
D. Teaching years (total)						
Less than 3	21.74%	25.00%	33.33%	24.24%	11.11%	29.41%
3 - 5	8.70%	25.00%	29.17%	39.39%	---	29.41%
6 - 10	8.70%	12.50%	33.33%	9.09%	---	23.53%
11 - 15	30.43%	25.00%	---	12.12%	66.67%	5.88%
16 or more	30.43%	8.33%	---	12.12%	22.22%	11.76%
No response	---	4.17%	4.17%	3.03%	---	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
E. Teaching years (in given school)						
Less than 1	8.70%	12.50%	12.50%	24.24%	22.22%	52.94%
1 - 2	86.96%	70.83%	33.33%	66.67%	22.22%	23.53%
3 - 5	---	4.17%	33.33%	---	44.44%	11.76%
6 - 10	---	---	12.50%	---	11.11%	11.76%
11 or more	---	8.33%	---	---	---	---
No response	4.35%	4.17%	8.33%	9.09%	---	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
F. Teaching income						
$ 6800 - 7800	17.39%	20.83%	50.00%	12.12%	11.11%	17.65%
7900 - 9100	17.39%	29.17%	29.17%	39.39%	11.11%	41.18%
9200 - 10400	26.09%	16.67%	12.50%	15.15%	---	17.65%
10500 - 11700	13.04%	12.50%	---	6.06%	---	---
11800 or more	26.09%	16.67%	---	15.15%	---	23.53%
No response	---	4.17%	8.33%	12.12%	77.78%	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2 (cont.)

	School 1 N = 23	School 2 N = 24	School 3 N = 24	School 4 N = 33	School 5 N = 9	School 6 N = 17
G. Non-teaching income						
None	60.87%	62.50%	70.83%	54.55%	44.44%	41.18%
less than $500	26.09%	8.33%	8.33%	21.21%	---	29.41%
$ 500 - 1500	8.70%	16.67%	12.50%	6.06%	---	29.41%
1600 - 2500	---	4.17%	---	3.03%	---	---
2600 or more	---	---	---	3.03%	---	---
No response	4.35%	8.33%	8.33%	12.12%	55.56%	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
H. Education						
1 - 3 years college	---	4.17%	8.33%	3.03%	11.11%	---
Bachelor's degree	60.87%	37.50%	66.67%	69.70%	66.67%	70.59%
Master's degree	17.39%	29.17%	8.33%	12.12%	11.11%	17.65%
Master's degree + credits	17.39%	25.00%	8.33%	6.06%	---	11.76%
C.A.G.S. or doctorate	4.35%	---	8.33%	---	---	---
No response	---	4.17%	8.33%	9.09%	11.11%	---
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

X^2_A = 15.05; NS X^2_B = 6.35; NS X^2_C = 35.09; NS X^2_D = 49.64; p < .01

X^2_E = 71.74; p < .01 X^2_F = 75.12; p < .01 X^2_G = 40.89; p < .05 X^2_H = 25.76; NS

in the present study for soliciting indications of innova-
tiveness. As a method of organizing instruction; it differs
from the traditional structure which places teachers in in-
dividual classrooms with little or no planned interaction
between them and/or between them and students other than
those in their class. Team teaching has enjoyed consider-
able prominence in educational circles in the last decade,
and adoption is now rather widespread, particularly in ele-
mentary schools. However, its exact historical antecedents
are somewhat difficult to pinpoint. Dean (1961) reports
that the first use of the term "team teaching" was in a
1957 edition of the Education Digest. Goodlad (1969) sug-
gests that team teaching had its beginnings in 1955 when a
Ford Foundation meeting exploring new approaches to teacher
education considered a paper by Francis Keppel recommending
reorganization of the school horizontally.

Anderson (1964) attributes team teaching to programs
launched by certain universities across the country. In
particular, he cites a program involving the Harvard Gradu-
ate School of Education and the Lexington, Massachusetts
school system which saw the Franklin School in Lexington
begin team teaching in 1957. Dean (1961) suggests that the
most recent prototype of the current concept was the Coop-
erative Group Plan, in operation in the 30's, which uti-
lized small groups of teachers, each with its own chairman,
to plan the work for a group of children. In fact, most of

the team teaching arrangements in operation are often refer-
red to as "cooperative teaching" to distinguish them from
arrangements involving hierarchical relationships between
teachers.

Thus, in the present study, a generic definition of
team teaching was used, namely that team teaching was defined
as:

> an arrangement whereby two or more
> teachers, with or without teacher aides,
> cooperatively plan, instruct and evaluate
> one or more class groups. This activity
> takes place in an appropriate instructional
> space and given length of time, so as to
> take advantage of the special competencies
> of the team members.

No obvious variability as to the nature of team teaching in
the six schools was noted. As will be seen in a later sec-
tion, however, variability as to the number of teachers
using team teaching did exist.

To provide a picture of team teaching in the six schools,
the perceived advantages and disadvantages will be presented.
Two open-ended questions (see Table 1) were used to solicit
the respondents' perceptions of the advantages and disadvan-
tages of the use of team teaching in their school. All
responses for both categories were categorized.

Table 3 shows the advantages of team teaching cited by
the teachers in each school. Exposure of teachers to new
ideas and methods was the most frequently cited advantage,

Table 3

PERCEIVED ADVANTAGES OF TEAM TEACHING BY SCHOOL

Category	Number of mentions						
	School 1	School 2	School 3	School 4	School 5	School 6	Total
1. Exposure of teachers to new ideas and methods	5	12	7	23	2	4	53
2. More effective use of teacher skills	11	9	3	11	3	5	42
3. More flexible (e.g., individualized) instruction	5	4	8	17	1	4	39
4. Exposure of children to differing points of view	6	3	6	11	3	4	33
5. Able to group more flexibly	1	2	3	5	1	2	14
6. Greater student interest		2	3	4	2	1	12
7. More and better use of planning time	6	1	1	2	1	1	11

Table 3 (cont.)

Category	Number of mentions						
	School 1	School 2	School 3	School 4	School 5	School 6	Total
8. More accurate assess- ment of students		3	1	5		1	10
9. "Happier" teachers	2	1		1			4
Total	36	37	32	79	12	22	218

with teachers noting the increased communication and coordination among teachers which resulted from employing a team teaching approach. More effective use of teacher skills was the second most frequently cited advantage. More flexible instruction was cited by many as an advantage with teachers noting they could provide children more individualized programming and one-to-one help. The exposure of children to differing points of view was also noted as an advantage by many teachers. Teachers felt they were able to group their students more flexibly and maintain greater student interest. Also, the teachers indicated that they were able to plan more effectively, to assess their students more accurately, and, in general, to be happier in a team teaching situation. In all, 218 advantages were noted by the respondents.

Naturally, there is another side to the picture. Table 4 shows that teachers saw two major problems with team teaching. First and foremost among the cited disadvantages was the personality conflict and inability to work together inevitable in a situation requiring cooperation where little or none was called for previously. The second group of disadvantages cited were the (perceived) difficulties experienced by children presented with a variety of approaches, philosophies, and personalities and the children's resultant confusion and insecurity. The frequency with which this

Table 4

PERCEIVED DISADVANTAGES OF TEAM TEACHING BY SCHOOL

Category	Number of mentions						
	School 1	School 2	School 3	School 4	School 5	School 6	Total
1. Personality conflicts	3	3	6	17	1	3	33
2. Adjustment for children to differing approaches and personalities	3	2	5	9	2	2	23
3. Discipline problems		1	5	4	1		11
4. Adjustment to working together (need for retraining)	2	1	1	4			8
5. Grouping difficulties	1	1	2	3		1	8
6. More work for teachers	3		2	1		1	7
7. Not enough time	2	1	1	3			7
8. Difficulty in knowing larger number of students well	1	1	1				3
9. Need for proper facilities		1	1				2

Table 4 (cont.)

Category	Number of mentions						
	School 1	School 2	School 3	School 4	School 5	School 6	Total
10. Grading difficulties		1					1
Total	15	12	24	41	4	7	103

type of comment was made is particularly intriguing in light
of the large number of citations given "exposure to differ-
ing points of view" in response to the advantages question.
This ambivalence is further reflected by the inclusion of
discipline problems, grouping difficulties, lack of time,
and the need for adjustment to working together as disadvan-
tages. Certainly, team teaching is far from a conflict free
innovation. In total, 103 disadvantages were cited.

Finally, the ratio between the total number of cited
advantages and disadvantages listed for each school was cal-
culated and is presented below in Table 5.

Table 5

SUMMARY OF PERCEIVED ADVANTAGES AND DISADVANTAGES
FOR THE SIX ELEMENTARY SCHOOLS

School	Number of Advantages Cited	Number of Disadvantages Cited	Ratio (A:D)
1	36	15	2.4:1
2	37	12	3:1
3	32	24	1.3:1
4	79	41	2.0:1
5	12	4	3:1
6	22	7	3.1:1

Relatively speaking, this index indicates that School 6
teachers, followed closely by Schools 2 and 5, perceived
more advantages over disadvantages than did teachers in the
other three schools. Whether this is related to their in-
novativeness will be explored in the section on hypothesis-
testing.

The Dependent Variables

Time of awareness. In order to allow for easy compari-
son of the six schools, responses to the question, "When did
you first hear about team teaching?" were standardized in
the following manner:

1. The month of first awareness was divided by 12
    to yield a "portion of a year" score, e.g.,
    (month) 9 ÷ 12 = .75. If no month was reported,
    the calculation assumed first awareness occured
    in September (month 9) of the given year. This
    assumption was based on the fact that the vast
    majority of those responding noted September
    as the month of their initial awareness.

2. The year of first awareness was subtracted
    from 1971 to yield a "years ago" score, e.g.,
    71 - 65 Year) = 6.

3. The "portion of a year" score obtained in
    step 1 was subtracted from the "years ago"
    score obtained in step 2 to yield a combined
    score for each respondent of the "whole years
    and portion of years ago" they had first
    heard of team teaching. The calculation
    assumed a zero-point of January 1971, that
    is, each score is a "how many years ago (prior
    to January 1, 1971)" score. A complete
    example for respondent X is as follows:

Q. "When did you first hear about team teaching?
(as best you can recall)

A. (month) __September__ (year) __1965__ "

Step 1. Portion of a year score = (month of repor-
ted first awareness)/(months in a year)=
9/12 = .75.

Step 2. Years ago score = 1971 - year of reported
first awareness = 1971 - 1965 = 6.

Step 3. Combined score = years ago score - portion
of a year score = 6 - .75 = 5.25 (years
ago).

A summary of the results for each school is presented in
Table 6.

Table 6

INNOVATION AWARENESS DATES FOR THE SIX ELEMENTARY SCHOOLS

	Mean date (years ago)	Standard deviation	Range
School 1 (N = 18)	7.45	3.14	2.25 - 12.25
School 2 (N = 20)	7.98	8.22	1.25 - 38.66
School 3 (N = 23)	3.92	2.16	1.25 - 10.25
School 4 (N = 32)	5.63	3.00	.25 - 16.25
School 5 (N = 9)	2.41	1.34	.17 - 4.42
School 6 (N = 13)	6.71	2.93	3.08 - 12.25
Schools 1-6 (N = 115)	5.85	4.48	.17 - 38.66

At first glance, it would appear that School 2 teachers heard about team teaching earlier than teachers in the other schools. However, it should be noted that the calculations for School 2 include a respondent who reports having heard about team teaching in April, 1932. This response skews the mean date of awareness for School 2 considerably. Without this score, the mean for School 2 is 6.37, a score which ranks School 2 third. It is obvious this respondent is reporting awareness of a practice which historically preceded team teaching per se, perhaps the Cooperative Group Plan (indeed, inspection of this respondent's age and years of experience place her in a position to have heard of this plan). However, for all practical purposes, she is operating from a congruent definition of team teaching as practiced in her school, and therefore her score is included in subsequent calculations.

Thus, it seems that the teachers, in general, were aware of the innovation well prior to their adoption of it within their own school. Teachers in School 5, the parochial school, report having heard of team teaching most recently, followed by teachers in School 3, School 4, School 2 (using the corrected mean), School 6, and School 1. In terms of these six schools then, School 5 contains the latest "knowers" and School 1 the earliest "knowers". How

this compares with their actual adoption will be explored in the following sub-section.

Time of adoption. Responses to the question, "Have you used team teaching yourself in this school? When did you first use it?" were standardized in the same manner as the preceding time of awareness responses. In this calculation, if no month was reported, the response was dropped from the sample. A total of 72 complete responses were included. A summary of the results is presented in Table 7.

Table 7

INNOVATION ADOPTION DATES FOR THE SIX ELEMENTARY SCHOOLS

	Mean date (years ago)	Standard deviation	Range
School 1 (N = 14)	2.48	3.14	0.00 - 8.66*
School 2 (N = 12)	0.97	0.41	0.17 - 9.00
School 3 (N = 10)	1.28	2.49	0.17 - 8.25
School 4 (N = 24)	1.31	1.08	0.25 - 5.00
School 5 (N = 4)	0.92	0.82	0.25 - 1.92
School 6 (N = 8)	1.46	1.59	0.25 - 5.25
Schools 1-6 (N = 72)	1.47	1.81	0.00 - 9.00

* One teacher in School 1 reported adoption in January 1971, giving her a score of -0.08 when her response was standardized. This score depressed the School 1 mean by an insignificant amount.

Relatively speaking, School 1 teachers adopted team teaching the earliest, followed by teachers in School 6, School 4, School 3, School 2, and School 5. It is interesting to note that School 5 was the most recent adopter -- School 5 also indicated the most recent awareness of team teaching. In diffusion terms, School 5 would be classified as a late knower and a late adopter relative to the other five schools. In order to ascertain the distribution of the adoption rate <u>within</u> the six schools, the responses for each of the schools were categorized and are presented in Figure 1 . As expected, this data is consistent with that previously presented.

An inspection of these scores seems to indicate that one of the original criteria for the selection of team teaching as the innovation investigated has been violated. The original selection of schools was based in part on the reported date of adoption of team teaching, and in all cases this date was within the past two years. This "official" date of adoption was obtained from the principal yet at least one teacher in every school but School 5 reports having adopted team teaching anywhere from 3.66 - 9.00 years prior to January 1971. Who is correct? In this case, it seems reasonable to assume that the dates reported by individual teachers are accurate. In some cases, especially in School 1, teachers may have disregarded the qualifying

Figure 1. Individual Adoption Rate for Team Teaching

Number of Years Ago the Respondents Reported Adopting the Innovation

KEY: No Response   Not Adopted

Percentage of Respondents

57
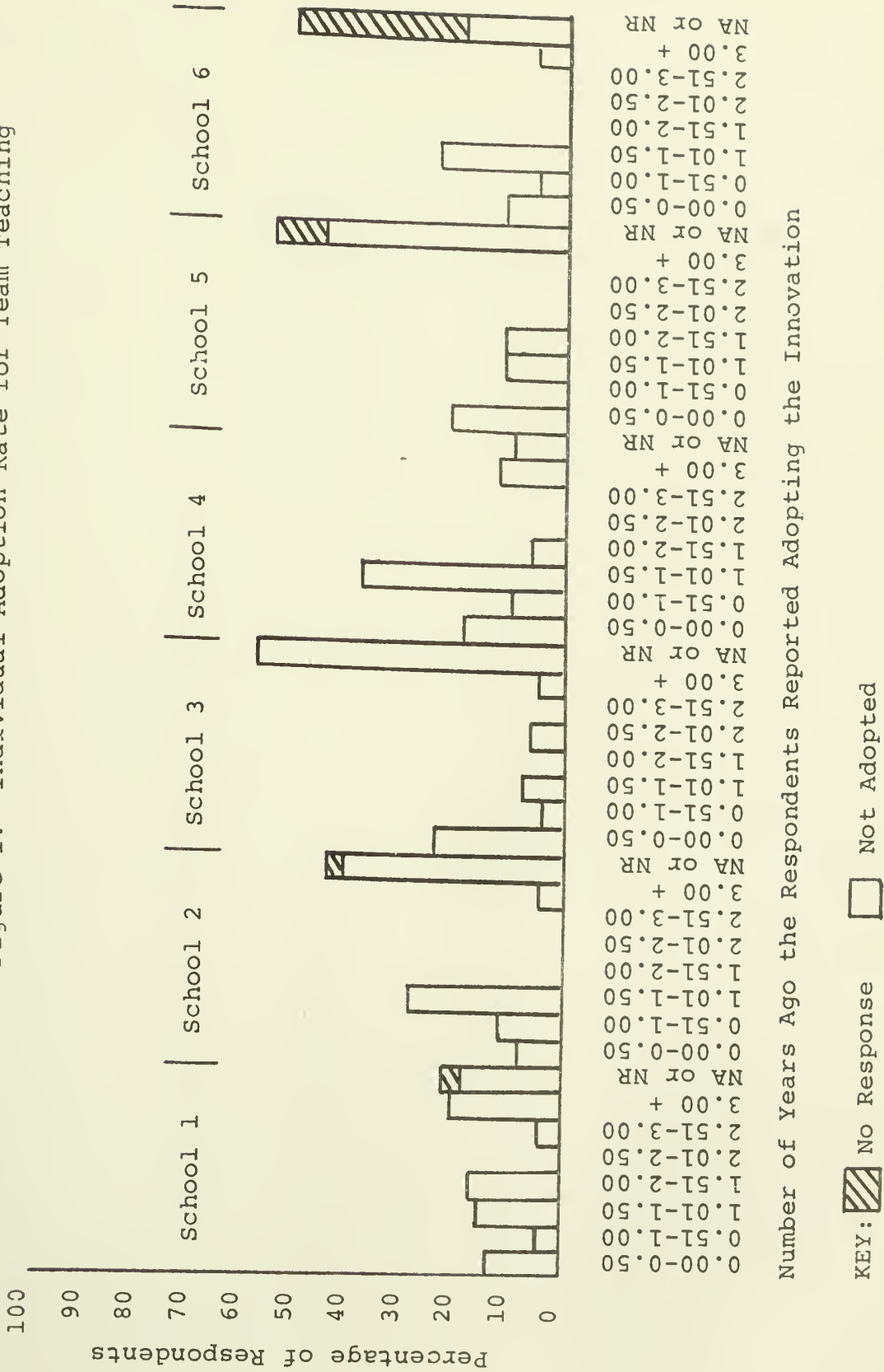
phrase "in this school" when responding to the question.
Indeed, School 1 was opened in 1969 so the foregoing seems
a legitimate explanation. However, a large number of the
School 1 teachers had been working together for several
years prior to being assigned to the new school, so that in
terms of their influence within the group it seemed reason-
able to include their responses in the calculations.

In all cases, it is clear that inclusion of all
responses would be further supported if the teachers repor-
ted that the adoption of team teaching was their own deci-
sion, not one made by someone else that they had to comply
with. Also it will be recalled that "freedom of choice"
regarding adoption of an innovation is a prerequisite to
inclusion of time of adoption as a meaningful variable.

That the teachers in each school, in the main, did
view the decision to adopt or not adopt team teaching as
one over which they had individual control is shown in Table
8. Thus we see that in Schools 1, 2, 3, and 4 the largest
percentage of the teachers responding perceived the decision
as an optional decision, with the respondents in School 6
equally divided between those who perceived it as a volun-
tary or a contingent decision. The perceptions seem some-
what less clearcut in School 5. Yet in no case did a sub-
stantial number of teachers view the decision to adopt team
teaching as one with which they were required to comply. It

Table 8

PERCEIVED DECISION-MAKING PROCESS REGARDING TEAM TEACHING

Type of Decision	School 1 N = 23	School 2 N = 24	School 3 N = 24	School 4 N = 33	School 5 N = 9	School 6 N = 17
1. Your personal decision (sub-type of optional)	21.74%	--	20.83%	3.03%	11.11%	23.53%
2. A decision upon which you had no influence but you had the choice of adopting it or not (optional decision)	26.09%	29.17%	58.33%	45.45%	11.11%	17.65%
3. A decision by consensus but you had the option of adopting it or not (contingent decision)	21.74%	4.17%	4.17%	15.15%	11.11%	23.55%
4. A decision by consensus but you were required to adopt it (collective decision)	8.70%	4.17%	--	--	11.11%	11.76%
5. A decision made for you and you were required to adopt it (authority decision)	8.70%	29.17%	8.33%	9.09%	--	11.76%

Table 8 (cont.)

Type of Decision	School 1 N = 23	School 2 N = 24	School 3 N = 24	School 4 N = 33	School 5 N = 9	School 6 N = 17
6. No response	13.04%	33.33%	8.33%	27.27%	55.56%	11.76%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

is clear that any organizational decisions made by the individual schools were at worst enabling decisions allowing teachers a choice as to whether they individually adopted or rejected team teaching. For this reason, time of adoption was retained as a dependent variable and included in the testing of the hypotheses in the next section.

Innovation internalization. It will be recalled that a four-item scale first employed by Lin (1966a) was used to determine the extent to which a teacher saw team teaching as being a practice which was relevant to his role performance within the organization and to which he was attitudinally committed.

This scale was re-validated by calculating the inter-item correlations. These correlations ranged from 0.2035 to 0.5910. As would be expected, the individual items also correlated highly with the composite innovation internalization score. The range of these correlations was from 0.7063 to 0.8347.

A summary of the results for each school is presented in Table 9. The possible range for this variable was from a (numerically) low score of 4, indicating maximum internalization, to a score of 20, indicating minimum internalization. Relatively speaking, School 4 teachers showed the greatest innovation internalization, followed by Schools 1, 2, 5, 6 and 3 respectively.

Table 9

INNOVATION INTERNALIZATION SCORES FOR
THE SIX ELEMENTARY SCHOOLS

	Mean	Standard deviation
School 1 (N = 23)	6.30	2.36
School 2 (N = 24)	6.33	3.10
School 3 (N = 24)	7.83	3.99
School 4 (N = 33)	5.67	1.65
School 5 (N = 9)	6.44	2.35
School 6 (N = 17)	7.24	3.01
Schools 1-6 (N = 130)	6.56	2.87

Change orientation. Similarly, a four-item scale was
used to determine the respondents' general attitude toward
change and innovation. This scale also had a theoretical
range of 4 to 20, with a low (numerically) score indicating
general positive predisposition toward change.

The change-orientation scale was also revalidated by
calculating inter-item correlations. These correlations
ranged from 0.0751 to 0.4799. High positive correlations
with the composite change orientation score were also ob-
tained with the range from 0.5325 to 0.8503.

A summary of the results for each school is presented
in Table 10.

Table 10

SELF-PERCEIVED CHANGE ORIENTATION FOR
THE SIX ELEMENTARY SCHOOLS

	Mean	Standard deviation
School 1 (N = 23)	6.17	2.31
School 2 (N = 20)	6.67	3.00
School 3 (N = 23)	7.30	3.11
School 4 (N = 31)	5.61	1.56
School 5 (N = 9)	5.67	2.00
School 6 (N = 17)	6.00	1.70
Schools 1-6 (N = 127)	6.28	2.42

School 4 teachers also showed the most positive predilection
toward change in comparison with the other five schools,
followed by Schools 5, 1, 6, 2 and 3 respectively.

Hypothesis Testing

This study was designed to explore the relationship
between the communication structure within a school and
various indicators of innovativeness. Further, the design
of the data collection facilitated consideration of certain
other characteristics of the teachers which were also
hypothesized to be related to innovativeness. The nature of

the data obtained for these two groups of independent vari-
ables necessitated two different methods of analysis. The
first of these was concerned with Hypotheses 1 - 11 which
specified the individual respondent as the unit of analysis.
The second dealt with Hypotheses 12 - 15 which specified the
school as the unit of analysis.

The first set of hypotheses (1 - 11) was tested by com-
puting a multiple regression equation for each of the four
dependent variables. All hypotheses involved the testing
of main effects. The general form of these equations is
shown in Formula 3.1.

$$I = b_1 \text{ (variable 1)} + b_2 \text{ (variable 2)} + b_3 \text{ (variable 3)} \ldots \ldots + b_n \text{ (variable n)} + C \qquad [3.1]$$

where

  I represents an indicator of innovativeness

  b_1 represents the beta weight associated with
   variable 1, e.g., age

  b_2 represents the beta weight associated with
   variable 2, e.g., years of teaching in total

  b_3 represents the beta weight associated with
   variable 3, e.g., years of teaching in a
   given school

  b_n represents the beta weight associated with
   the nth variable

  C represents the constant in the equation

In each case, the research hypothesis involved the beta
weight (main effect) associated with the respective variable,
e.g., b_1. It will be recalled that the posited relationship

between each independent variable and the dependent variable is tested while the relationships of the other independent variables and the dependent variable are controlled. The rules for these tests followed the form:

H_o: b_1 = 0

H_1: b_1 > 0

p = .05

reject H_o if t (computed) > t (n - # variables; .05) All variables in the obtained equation were tabulated in descending order of effects. Standardized beta weights were used as indicators of magnitude of relative effect. For ease of presentation, the data for each of the four regressions are presented in Tables 11 - 14, followed by a discussion of the individual hypotheses.

It should be noted that relatively greater innovativeness is indicated by a numerically high score on Innovativeness$_1$ (time of awareness) and Innovativeness$_2$ (time of adoption) and by a numerically low score on Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change orientation).

Table 11

REGRESSION EQUATION FOR ALL VARIABLES WITH
DEPENDENT VARIABLE INNOVATIVENESS$_1$ (TIME OF AWARENESS)

	Variables*	b'	b	SE(b)	t	p
15.	Perceived student attitude toward the innovation	2.847	16.720	1.960	8.5295	< .01
22.	Perceived student receptivity to innovation	-2.749	- 9.275	1.066	8.7007	< .01
25.	Effect of School 3	-1.282	-14.757	1.823	8.0957	< .01
27.	Effect of School 5	-1.225	-21.553	2.596	8.3008	< .01
3.	Years of teaching (total)	.846	2.727	.707	3.8570	< .01
23.	Effect of School 1	- .618	- .723	1.413	5.1184	< .01
5.	Teaching income	- .595	- 1.943	.672	2.8926	< .01
16.	Number of disadvantages	.592	3.808	.673	5.6606	< .01
17.	Number of advantages	.549	1.906	.274	6.9649	< .01
13.	Norms-attitude toward innovators	- .512	- 2.626	.423	6.2153	< .01
26.	Effect of School 4	- .402	- 4.128	1.028	4.0137	< .01
24.	Effect of School 2	- .361	- 4.153	1.202	3.4542	< .01

Table 11 (cont.)

	Variables	b'	b	SE(b)	t	p
6.	Non-teaching income	- .319	- 1.666	.402	4.1442	< .01
14.	Perceived benefit to students	.282	1.734	.610	2.8432	< .01
18.	Perceived decision-making power	- .246	- .862	.260	3.3178	< .01
21.	Opinion leadership score (self-perceived)	.241	.773	.219	3.5282	< .01
2.	Age	- .180	- .692	.439		NS
4.	Years of teaching (in given school)	.160	.864	.433	1.9963	< .05
12.	Information level re new practices	- .153	- .292	.130	2.2463	< .05
7.	Education	.026	.147	.502		NS

* Variables listed in order of importance (b') from direct regression of all variables.

$R = .80$, $R^2 = .64$, df = 94, constant = 48.21

Table 12

REGRESSION EQUATION FOR ALL VARIABLES WITH
DEPENDENT VARIABLE INNOVATIVENESS$_2$ (TIME OF ADOPTION)

	Variables*	b'	b	SE(b)	t	p
15.	Perceived student attitude toward the innovation	-.782	-1.850	1.012		NS
22.	Perceived student receptivity to the innovation	.778	1.057	.550		NS
16.	Number of disadvantages	-.440	-1.142	.347	3.2885	< .01
23.	Effect of School 1	.309	1.458	.729		NS
17.	Number of advantages	-.309	- .432	1.412	3.0623	< .01
25.	Effect of School 3	.253	1.174	.941		NS
21.	Opinion leadership score (self-perceived)	-.248	- .321	.113	2.8346	< .01
3.	Years of teaching (total)	-.243	- .316	.365		NS
5.	Teaching income	.237	.312	.347		NS
4.	Years of teaching (in given school)	.227	.496	.223	2.2222	< .05
27.	Effect of School 5	.195	1.384	1.340		NS
2.	Age	.186	.289	.227		NS

Table 12 (cont.)

	Variables*	b'	b	SE(b)	t	p
13.	Norms-attitude toward innovators	.179	.369	.218		NS
14.	Perceived benefit to students	-.154	- .380	.315		NS
12.	Information level re new practices	.152	.117	.067		NS
6.	Non-teaching income	-.123	- .258	.208		NS
7.	Education	.118	.266	.259		NS
26.	Effect of School 4	.089	.368	.531		NS
24.	Effect of School 2	-.079	- .369	.620		NS
18.	Perceived decision-making power	.076	.107	.134		NS

* Variables listed in order of importance (b') from direct regression of all variables.

$R = .64$, $R^2 = .41$, df = 51, constant = 0.42

Table 13

REGRESSION EQUATION FOR ALL VARIABLES WITH
DEPENDENT VARIABLE INNOVATIVENESS$_3$
(INNOVATION INTERNALIZATION)

	Variables*	b'	b	SE(b)	t	p
3.	Years of teaching (total)	.750	1.547	.428	3.6176	< .01
5.	Teaching income	-.666	-1.392	.406	3.4271	< .01
27.	Effect of School 5	-.344	- .387	1.570	2.4659	< .05
16.	Number of dis-advantages	.327	1.346	.409	3.3077	< .01
13.	Norms-attitude toward innovators	.305	1.00	.255	3.9197	< .01
23.	Effect of School 1	-.291	-2.176	.854	2.5469	< .05
24.	Effect of School 2	-.266	-1.958	.727	2.6933	< .01
25.	Effect of School 3	-.255	-1.881	1.102		NS
22.	Perceived student receptivity to the innovation	.243	.524	.648		NS
21.	Opinion leader-ship score (self-perceived)	-.231	- .474	.133	3.5746	< .01
2.	Age	-.198	- .487	.266		NS
14.	Perceived benefit to students	.189	.742	.369	2.0122	< .05

Table 13 (cont.)

	Variables*	b'	b	SE(b)	t	p
12.	Information level re new practices	.164	.200	.079	2.5515	< .05
15.	Perceived student attitude toward the innovation	.150	.563	1.185		NS
26.	Effect of School 4	-.136	- .895	.622		NS
17.	Number of advantages	-.093	- .206	.165		NS
7.	Education	.091	.328	.304		NS
4.	Years of teaching (in given school)	.057	.198	.262		NS
6.	Non-teaching income	-.057	- .189	.243		NS
18.	Perceived decision-making power	.008	.019	.157		NS

* Variables listed in order of importance (b') from direct regression of all variables.

$R = .82$, $R^2 = .68$, df = 109, constant = 15.12

Table 14

REGRESSION EQUATION FOR ALL VARIABLES WITH
DEPENDENT VARIABLE INNOVATIVENESS$_4$ (CHANGE ORIENTATION)

	Variables*	b'	b	SE(b)	t	p
22.	Perceived student receptivity to the innovation	1.989	3.616	.732	4.9386	< .01
15.	Perceived student attitude toward the innovation	-1.582	-5.006	1.346	3.7193	< .01
25.	Effect of School 3	.618	3.836	1.252	3.0645	< .01
13.	Norms-attitude toward innovators	.494	1.366	.290	4.7094	< .01
16.	Number of disadvantages	- .376	-1.303	.462	2.8196	< .01
2.	Age	.343	.712	.302	2.3599	< .05
27.	Effect of School 5	.311	2.949	1.783		NS
18.	Perceived decision-making power	.273	.515	.178	2.8890	< .01
14.	Perceived benefit to students	- .265	- .878	.419	2.0964	< .05
26.	Effect of School 4	.264	1.462	.706	2.0700	< .05
3.	Years of teaching (total)	- .237	- .412	.486		NS
24.	Effect of School 2	.236	1.464	.826		NS

Table 14 (cont.)

	Variables*	b'	b	SE(b)	t	p
23.	Effect of School 1	.234	1.477	.970		NS
17.	Number of advantages	- .226	- .423	.188	2.2527	< .05
21.	Opinion leader-ship score (self-perceived)	- .173	- .299	.151	1.9860	< .05
12.	Information level re new practices	- .151	- .155	.089		NS
4.	Years of teaching (in given school)	.126	.369	.297		NS
6.	Non-teaching income	.108	.303	.276		NS
7.	Education	.091	.274	.345		NS
5.	Teaching income	- .063	- .112	.461		NS

* Variables listed in order of importance (b') from direct regression of all variables.

$R = .64$, $R^2 = .41$, $df = 106$, constant = -5.78

Teacher Characteristics

Hypothesis 1. Faculty who are younger will be more innovative. Of the 20 independent variables included in each of the four regression equations, age was accorded little relative importance. The analysis revealed that age was related to Innovativeness$_4$ (self-perceived change orientation). The beta weight associated with age (.712) was significant (t = 2.3599; p < .05) and the null hypothesis was rejected in this instance. No evidence was obtained to reject the null hypothesis that the beta weight associated with age was different from zero in the other three equations. Thus, Hypothesis 1 was only weakly supported. Table 15 presents a summary of the ranking obtained and probability level achieved in each of the four equations.

Table 15

RELATIVE IMPORTANCE OF AGE IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
2 Age	17**	NS	12**	NS	11**	NS	6**	<.05

*I_1 = time of awareness; I_2 = time of adoption; I_3 = innovation internalization; I_4 = change orientation

**Numbers given indicate rank (relative importance b^1) out of 20 independent variables included in direct regression

Hypothesis 2. Faculty who have more education will be more innovative. Table 16 presents a summary of the ranking obtained and the probability level achieved in each of the equations.

Table 16

RELATIVE IMPORTANCE OF EDUCATION IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
7 Education	20**	NS	17**	NS	17**	NS	19**	NS

    * see footnote Table 15
  ** see footnote Table 15

The analysis revealed that no relationship existed between education and innovativeness in any of the four equations. No evidence was obtained to reject the null hypothesis that the beta weights associated with education were different from zero. Thus, Hypothesis 2 was rejected.

Hypothesis 3. Faculty who earn more will be more innovative. This hypothesis was tested using two separate measures of earnings -- teaching income and non-teaching income. Table 17 summarizes the findings for this hypothesis. The analysis revealed that teaching income was related to Innovativeness$_1$ (time of awareness) and Innovativeness$_3$ (innovation internalization). The beta weights

associated with teaching income (-1.943 and -1.392 respectively) were significant (t = 2.8926; p < .01 and t = 3.4271; p < .01 respectively) and the null hypothesis was rejected in these instances. Non-teaching income was found to be related to Innovativeness$_1$ (time of awareness). Its beta weight (-1.666) was significant (t = 4.1442; p < .01) and the null hypothesis was rejected in this instance. No evidence was obtained to reject the null hypothesis in the remaining five instances. Thus, Hypothesis 3 was partially supported.

Table 17

RELATIVE IMPORTANCE OF INCOME IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
5 Teaching income	7**	<.01	9**	NS	2**	<.01	20**	NS
6 Non-teaching income	13**	<.01	16**	NS	19**	NS	18**	NS

    * see footnote Table 15
    ** see footnote Table 15

Hypothesis 4. Faculty who have taught fewer years in total will be more innovative. The findings for this hypothesis are summarized in Table 18. The analysis revealed that total years of teaching was related to Innovativeness$_1$ (time of awareness) with a significant beta weight (b = 2.727; t = 3.8570; p < .01) and also to Innovativeness$_3$

(innovation internalization) with a significant beta weight
(b = 1.547; t = 3.6176; p < .01). In these instances the
null hypothesis was rejected. No evidence was obtained that
the relationship of total teaching years and the other
measures of innovativeness was significantly different from
zero. Thus, Hypothesis 4 was partially supported.

Table 18

RELATIVE IMPORTANCE OF YEARS OF TEACHING (TOTAL)
IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
3 Years of teaching (total)	5**	<.01	8**	NS	1**	<.01	11**	NS

 * see footnote Table 15
** see footnote Table 15

Hypothesis 5. Faculty who have taught more years in a
given school will be more innovative. The analysis of the
findings for this hypothesis reveal that years of teaching
in a given school is related to Innovativeness$_1$ (time of
awareness) and Innovativeness$_2$ (time of adoption). The beta
weights associated with these relationships were significant
(b = .864; t = 1.0963; p < .05; b = .496; t = 2.2222; p <
.05) and in these instances the null hypothesis was rejected.
No evidence was found to indicate a significant relationship
between years of teaching in a given school and either

Innovativeness$_3$ (innovation internalization) or Innovativeness$_4$ (change orientation). Thus, Hypothesis 5 was partially supported. The findings for this hypothesis are summarized in Table 19 below. It is evident that this variable's relative importance is quite low in any event.

Table 19

RELATIVE IMPORTANCE OF YEARS OF TEACHING
(IN A GIVEN SCHOOL) IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
4 Years of teaching (in a given school)	18**	<.05	10**	<.05	18**	NS	17**	NS

* see footnote Table 15
** see footnote Table 15

Attributes of the Innovation

Hypothesis 6. Faculty who perceive an innovation's advantages as outweighing its disadvantages will be more innovative. In order for this hypothesis to be supported, the relative importance of the innovation's advantages should exceed the relative importance of its disadvantages. Table 20 summarizes the findings for this hypothesis. The analysis revealed that in all cases the number of disadvantages cited exceeded in relative importance the number of advantages cited. The number of disadvantages was related to all

four measures of innovativeness with significant beta weights in all cases (b = 3.808; t = 5.6606; p < .01; b = -1.142; t = 3.2885; p < .01; b = 1.346; t = 3.3077; p < .01; b = -1.303; t = 2.8196; p < .01 respectively). The number of advantages was related to Innovativeness$_1$ (time of awareness), Innovativeness$_2$ (time of adoption) and Innovativeness$_4$ (change orientation) with significant beta weights (b = 1.906; t = 6.9649; p < .01; b = -.432; t = 3.0623; p < .01; b = -.423; t = 2.2527; p < .05) in these instances. No evidence was obtained that the relationship of number of advantages and Innovativeness$_3$ (innovation internalization) was significantly different from zero. Thus, Hypothesis 6 was rejected.

Table 20

RELATIVE IMPORTANCE OF NUMBER OF ADVANTAGES
AND DISADVANTAGES IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
16 Number of disadvantages	8**	<.01	3**	<.01	4**	<.01	5**	<.01
17 Number of advantages	9**	<.01	5**	<.01	16**	NS	14**	<.05

* see footnote Table 15
** see footnote Table 15

Hypothesis 7. Faculty who perceive an innovation as

benefiting their students will be more innovative. The analysis revealed that perceived student benefit was related to Innovativeness$_1$ (time of awareness), Innovativeness$_3$ (innovation internalization), and Innovativeness$_4$ (change orientation). Significant beta weights (b = 1.734; t = 2.8432; p < .01; b = .742; t = 2.6122; p < .05; b = -.878; t = 2.0964; p < .05) were obtained in each of these instances and the null hypothesis rejected. No evidence was found to suggest that the relationship between perceived student benefit and Innovativeness$_2$ (time of adoption) was significantly different from zero. The findings for this hypothesis are presented in Table 21 and provide partial support for Hypothesis 7.

Table 21

RELATIVE IMPORTANCE OF PERCEIVED BENEFIT
TO STUDENTS IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
14 Perceived benefit to students	14**	<.01	14**	NS	12**	<.05	9**	<.05

* see footnote Table 15
** see footnote Table 15

Hypothesis 8. Faculty who perceive an innovation as being received enthusiastically by their students will be

more innovative. This hypothesis attempts to tap another
facet of the respondent's perceptions regarding the innova-
tion. The analysis revealed that perceived student attitude
toward the innovation was very important in three of the
four equations but significantly related to innovativeness
in only two of these three. The associated beta weight was
found to be significant in the case of $Innovativeness_1$ (time
of awareness) and $Innovativeness_4$ (change orientation) (b =
16.720; t = 8.595; p < .01; b = -5.006; t = 3.7193; p < .01
respectively) and the null hypothesis was rejected in each
instance. It should be noted that despite the fact that
this variable was the most important in the equation for
$Innovativeness_2$ (time of adoption), its associated beta
weight was not significantly different from zero, and thus
the null hypothesis was retained. Also, no significant re-
lationship was found with $Innovativeness_3$ (innovation inter-
nalization) and the null hypothesis was retained. Thus,
Hypothesis 8 was strongly supported in two of the four
instances. The findings are summarized in Table 22.

Table 22

RELATIVE IMPORTANCE OF PERCEIVED STUDENT ATTITUDE TOWARD
THE INNOVATION IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
15 Perceived student attitude toward the innovation	1**	<.01	1**	NS	14**	NS	2**	<.01

   * see footnote Table 15
  ** see footnote Table 15

In an effort to further test Hypotheses 7 and 8 and take
into account the likely interconnection between these percep-
tions (indeed, the correlation is .583), the two scores (on
variables 14 and 15) were combined to form a composite vari-
able called "perceived student receptivity to the innovation".
In general, the findings, summarized in Table 23, are consis-
tent with those for the two variables considered separately.
The analysis revealed high relative importance for the rela-
tionship between perceived student receptivity to the inno-
vation and Innovativeness$_1$ (time of awareness), Innovative-
ness$_2$ (time of adoption), and Innovativeness$_4$ (change orien-
tation). Again, however, the relationship to Innovative-
ness$_2$ (time of adoption) was not significantly different from
zero, and in this instance the null hypothesis was retained
as it was also in the case of Innovativeness$_3$ (innovation
internalization). The associated beta weights for

Innovativeness$_1$ (time of awareness) and Innovativeness$_4$ (change orientation) were significant (b = -9.275; t = 8.7007; p < .01; b = 3.616; t = 4.9386; p < .01 respectively) and the null hypothesis was rejected. These findings confirm those reported previously partially supporting Hypotheses 7 and 8.

Table 23

RELATIVE IMPORTANCE OF PERCEIVED STUDENT RECEPTIVITY
TO THE INNOVATION IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
22 Perceived student receptivity to the innovation (composite of variables 14 and 15)	2**	<.01	2**	NS	9**	NS	1**	<.01

 * see footnote Table 15
 ** see footnote Table 15

Group Norms

Hypothesis 9. Faculty who perceive that they have greater decision-making power over the adoption of an innovation will be more innovative. The findings for this hypothesis are summarized in Table 24. The analysis revealed that perceived decision-making power was important for both Innovativeness$_1$ (time of awareness) and Innovativeness$_4$ (change orientation) with the associated beta weights (b = -.852; t = 3.3178; p < .01; b = 5.15; t = 2.8890; p < .01)

significantly different from zero. Therefore, in these in-
stances the null hypothesis could be rejected. No evidence
was found to indicate that the relationships with the other
two measures of innovativeness were significantly different
from zero, and in these instances the null hypothesis was
retained. Thus, Hypothesis 9 was partially supported.

Table 24

RELATIVE IMPORTANCE OF PERCEIVED DECISION-MAKING POWER
IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
18 Perceived decision-making power	15**	<.01	20**	NS	20**	NS	8**	<.01

* see footnote Table 15
** see footnote Table 15

Hypothesis 10. Faculty who perceive the norms as fa-
voring innovators will be more innovative. The analysis for
this hypothesis revealed important relationships between
perceived norms and Innovativeness$_1$ (time of awareness),
Innovativeness$_3$ (innovation internalization) and Innovative-
ness$_4$ (change orientation). The associated beta weights
were significant (b = -2.626; t = 6.2153; p < .01; b = 1.00;
t = 3.9197; p < .01; b = 1.366; t = 4.7094; p < .01 respec-
tively), and the null hypothesis was rejected in each

instance. No significant difference from zero was found for the relationship between perceived norms regarding attitude toward innovators and Innovativeness$_2$ (time of adoption) and the null hypothesis was retained. Thus, Hypothesis 10 was generally supported. Table 25 summarizes the findings.

Table 25

RELATIVE IMPORTANCE OF NORMS-ATTITUDE TOWARD
INNOVATORS IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
13 Norms-attitude toward innovators	10**	<.01	13**	NS	5**	<.01	4**	<.01

    * see footnote Table 15
  ** see footnote Table 15

Hypothesis 11. Faculty who indicate a greater awareness of new practices will be more innovative. Information level regarding new practices was not a particularly important variable in any of the equations. However, the associated beta weights for the relationships with Innovativeness$_1$ (time of awareness) and Innovativeness$_3$ (innovation internalization) were significantly different from zero (b = -.292; t = 2.2463; p < .05; b = .200; t = 2.5515; p < .05 respectively) and the null hypothesis was rejected in these cases. No evidence was found to reject the null hypothesis for the

relationship of information level and Innovativeness$_2$ (time of adoption) and Innovativeness$_4$ (change orientation) and it was retained. Thus, Hypothesis 11 was weakly supported. The results are summarized in Table 26.

Table 26

RELATIVE IMPORTANCE OF INFORMATION LEVEL RE
NEW PRACTICES IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
12 Information level re new practices	19**	<.05	15**	NS	13**	<.05	16**	NS

* see footnote Table 15
** see footnote Table 15

In all of the analyses presented thus far, the effect of "school" has been controlled. That is, since there are factors at work in a given school which will affect its innovativeness, or any other condition being investigated, and since the measures being used can not tap all of these factors, it is necessary to control for their effect. By doing so, we can more confidently report that any main effect relationships discovered are in fact the result of a relationship between two variables independent from any ex-traneous school effects. To provide a clearer picture of the relative effect of school on each question, the results for

these variables are summarized below in Table 27. In all
cases, the effect of the other schools is relative to School 6.

Table 27

RELATIVE IMPORTANCE OF THE EFFECT OF SCHOOL
IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
23 Effect of								
School 1	6**	<.01	4**	NS	6**	<.05	13**	NS
24 Effect of								
School 2	12**	<.01	19**	NS	7**	<.01	12**	NS
25 Effect of								
School 3	3**	<.01	6**	NS	8**	NS	3**	<.01
26 Effect of								
School 4	11**	<.01	18**	NS	13**	NS	10**	<.05
27 Effect of								
School 5	4**	<.01	11**	NS	3**	<.05	7**	NS

    * see footnote Table 15
  ** see footnote Table 15

Summary of findings for Hypotheses 1 - 11. The analy-
ses conducted thus far in the investigation presented mixed
results. In no case was a hypothesis supported in all
analyses for the four measures of innovativeness. Hypothe-
sis 2 was rejected in all cases.

An inspection of the results of hypothesis testing,
summarized in Table 28, shows that the following twelve
variables (or sub-variables) were significantly related to
Innovativeness$_1$ (time of awareness):

Table 28

SUMMARY OF RESULTS OF TESTING HYPOTHESES 1 - 11

Independent variable	Dependent variable			
	I_1*	I_2*	I_3*	I_4*
H1. Age	NS	NS	NS	< .05
H2. Education	NS	NS	NS	NS
H3A. Teaching income	< .01	NS	< .01	NS
H3B. Non-teaching income	< .01	NS	NS	NS
H4. Years of teaching (total)	< .01	NS	< .01	NS
H5. Years of teaching (in a given school)	< .05	< .05	NS	NS
H6A. Number of disadvantages	< .01	< .01	< .01	< .01
H6B. Number of advantages	< .01	< .01	NS	< .05
H7. Perceived benefit to students	< .01	NS	< .05	< .05
H8. Perceived student attitude toward the innovation	< .01	NS	NS	< .01
H9. Perceived decision-making power	< .01	NS	NS	< .01
H10. Norms-attitude toward innovators	< .01	NS	< .01	< .01
H11. Information level re new practices	< .05	NS	< .05	NS

* I_1 = Innovativeness$_1$ (time of awareness); I_2 = Innovativeness$_2$ (time of adoption); I_3 = Innovativeness$_3$ (innovation internalization); I_4 = Innovativeness$_4$ (change orientation)

Teaching income
Non-teaching income
Years of teaching (total)
Years of teaching (in a given school)
Number of disadvantages
Number of advantages
Perceived benefit to students
Perceived student receptivity toward the innovation
Perceived decision-making power
Norms-attitude toward innovators
Information level re new practices

The following three variables (or sub-variables) were related to Innovativeness$_2$ (time of adoption):

Years of teaching (in a given school)
Number of disadvantages
Number of advantages

In like manner, six variables (or sub-variables) were related to Innovativeness$_3$ (innovativeness internalization) as follows:

Teaching income
Years of teaching (total)
Number of disadvantages
Perceived benefit to students
Norms-attitudes toward innovators
Information level re new practices

Finally, the following eight variables (or sub-variables) were related to Innovativeness$_4$ (change orientation):

Age
Number of disadvantages
Number of advantages
Perceived benefit to students
Perceived student attitude toward the innovation
Perceived student receptivity toward the innovation
Perceived decision-making power
Norms-attitude toward innovators

It should be noted that the findings relating variable 14 (perceived student benefit) and variable 15 (perceived student attitude toward the innovation) to Innovativeness$_1$ (time of awareness) and Innovativeness$_4$ (change orientation) must be treated very tentatively. The presence in the equations of variable 22 (perceived student receptivity to the innovation), which is a simple composite of the respondent's scores on variables 14 and 15, is likely to cause the beta weights on the latter variables to fluctuate radically. This is a result of the high correlations of the two single variables with the composite variable ($r_{14,22}$ = .63, $r_{15,22}$ = .90).

These findings suggest that the four measures of innovativeness are tapping different facets of a larger concept and emphasize the viability of the Innovativeness$_3$ and Innovativeness$_4$ measures -- innovation internalization and change orientation. That these four measures are essentially independent is supported by the fact that their intercorrelations were low, ranging from -0.1116 to 0.3805, with the highest correlation being between innovation internalization and change orientation. Indeed, the correlation,

0.3805, is lower than the 0.50 correlation Lin obtained in his study. Further, only three of the variables, number of disadvantages, perceived benefit to students, and norms-attitude toward innovators were significantly related to both these measures of innovativeness. It is also of interest to note that only three variables -- years of teaching in a given school, number of disadvantages and number of advantages were significantly related to the classic index -- Innovativeness$_4$ (time of adoption). Implications of these findings will be discussed in Chapter IV. The analysis presented thus far has utilized the individual as the unit of analysis. For the remaining hypotheses (12-15), the school is the unit of analysis. Thus, the presentation of results will be straightforward description.

Hypothesis 12. Schools which have a high degree of communication between early and late knowers will be more innovative. The testing of this hypothesis involved the combination of the time of awareness data with the data from the sociometric item in the following manner (as suggested

by Lin 1968). An incidence matrix made up of all the tea-
chers in each school was constructed. Each row designated
a nominating (advice-seeking) teacher and each column a
nominated (advice-sought) teacher. If teacher A nominated
teacher B, cell AB of the matrix had a value of 1, other-
wise it was zero. The ordering on the axes of the matrix
was based on the respondents' awareness date. The earliest
knowers occupied the first row and column, while the latest
knower occupied the last. Respondents who did not indicate
a complete awareness date or who were nominated in the
sociometric item but had not completed a questionnaire them-
selves were placed at the end. The matrix was partitioned
into months, thereby placing the teachers reporting aware-
ness during the same month into the same group. The five
completed matrices (incomplete data from School 2 precluded
its inclusion) are presented in Appendix C. In each matrix,
three types of communication were evident.

Upward communication is defined as one teacher's nomi-
nation of another teacher who had become aware of the inno-
vation earlier than himself (Lin 1968). In each matrix,
the cells in the left lower portion, excluding the parti-
tioned diagonal cells, were of upward communication. Con-
versely, downward communication was defined as one teacher's
nomination of another teacher who had become aware of the
innovation later than he had himself (Lin 1968). Thus

downward communication includes all the cells in the right
upper portion of the matrix, again excluding the diagonal
cells. Horizontal communication, defined as one teacher's
nomination of another teacher who had become aware of the
innovation at the same time as he had (Lin 1968), included
the diagonal cells. The results of the tabulations are pre-
sented below in Table 29.

Table 29

FREQUENCY AND DIRECTION OF (ADVICE-SEEKING)
COMMUNICATION PATTERNS RELATIVE TO INNOVATION AWARENESS

School	Upward Communication	Downward Communication	Horizontal Communication
School 1 (number of nominations = 46)	28%	50%	21%
School 3 (number of nominations = 42)	19%	66%	14%
School 4 (number of nominations = 86)	45%	47%	6%
School 5 (number of nominations = 25)	8%	80%	12%
School 6 (number of nominations = 25)	20%	64%	16%

For purposes of affecting innovativeness, at least initially, it is assumed that both upward and downward communication are more desirable than horizontal communication. Combining these two scores results in an index which can be used to rank the schools on degree of communication between early and late knowers. The results of this ranking compared with the school's rank on the four measures of innovativeness are presented in Table 30.

Table 30

COMPARISON OF RANK ON COMMUNICATION BETWEEN
EARLY AND LATE KNOWERS AND INNOVATIVENESS

School	Communication	Rank on:			
		I_1*	I_2*	I_3*	I_4*
School 1	5	1	1	2	4
School 3	3	4	4	5	5
School 4	1	3	3	1	1
School 5	2	5	5	3	2
School 6	4	2	2	4	3

* see footnote Table 15

Based on consideration of Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change orientation) scores, School 4 is the most innovative and also exhibits the greatest amount of vertical communication. However, the

results for Innovativeness$_1$ (time of awareness) and Innovativeness$_2$ (time of adoption) are not consistent with this. Thus, Hypothesis 12 was only partially supported.

Group Structure

Thus far the data presented has not resulted in the identification of one school that is clearly more innovative, according to the four measures employed, than any other. Based on Innovativeness$_1$ (time of awareness) and Innovativeness$_2$ (time of adoption), School 1 is the "most" innovative and School 5 the "least" innovative. Based on Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change orientation), School 4 is the "most" innovative and School 3 the "least" innovative. In between, the results indicate wide variability. In attempting to clarify the situation, the advice-seeking network among teachers in each of the schools was inspected to determine if structural clues might eliminate the inconsistencies in the initial data.

The sociograms of advice-seeking patterns among the teachers for School 1 and Schools 3 - 6 (sociometric data for School 2 was not available) are presented in Figures 2 - 6. A visual check of the sociograms would seem to indicate some differences, although no obvious types of structures
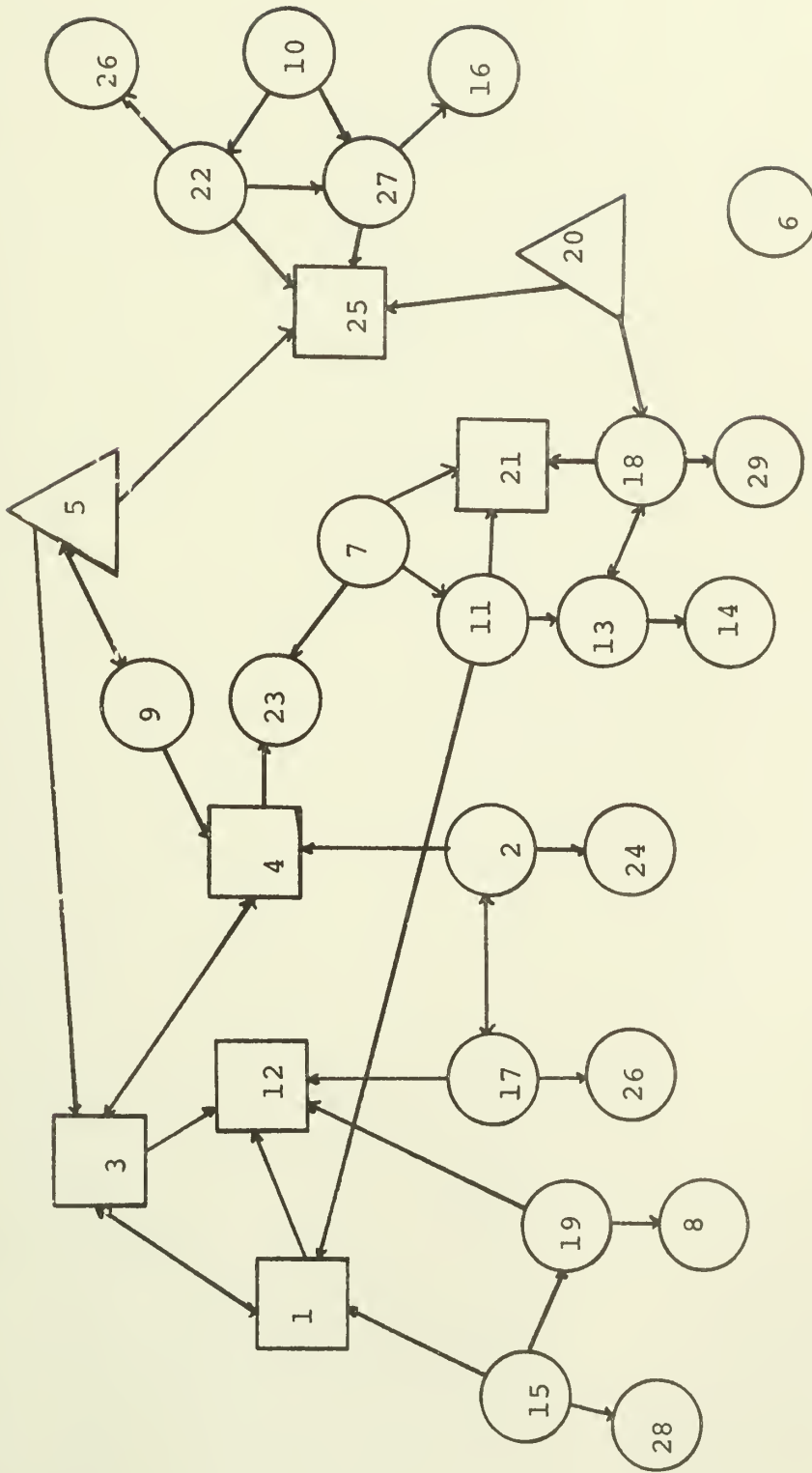
Figure 2. Sociogram of (advice-seeking) communication network for teachers in School 1.

KEY:

□ Opinion Leader

▨ Primary Liason

△ Secondary Liason
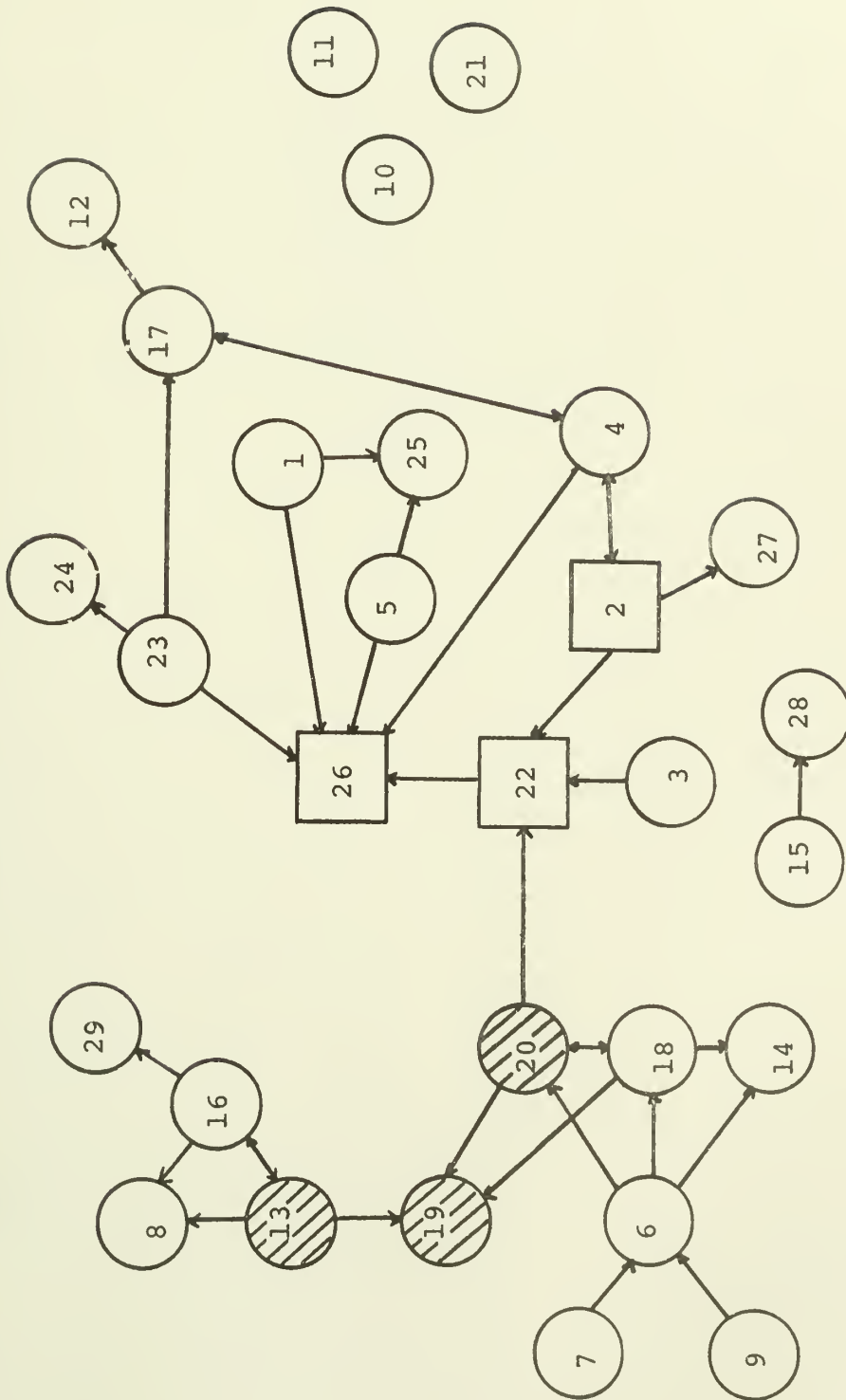
◯ Teacher X

Figure 3. Sociogram of (advice-seeking) communication network for teachers
in School 3. (see Figure 2 for key to symbols)

98
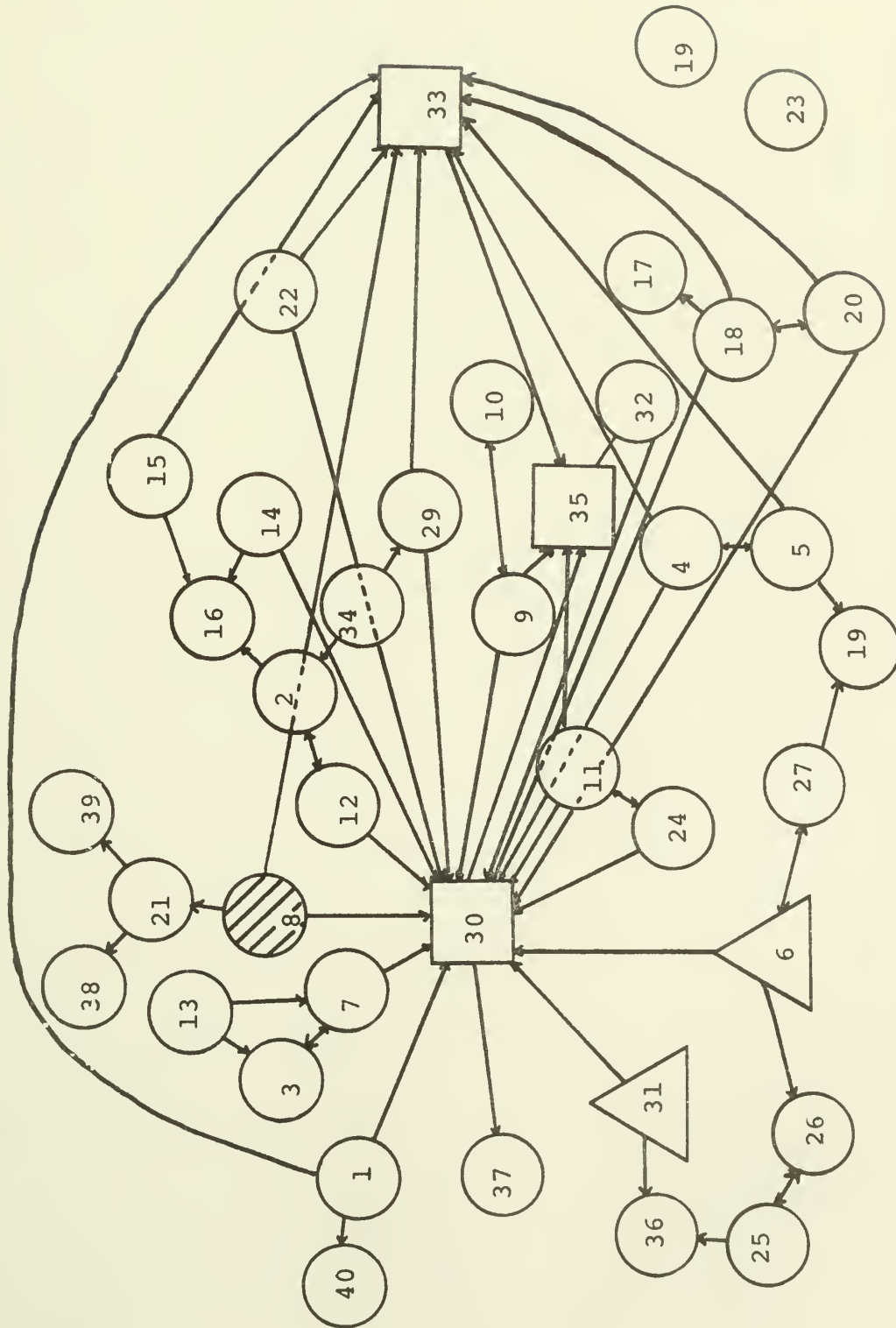
Figure 4. Sociogram of (advice-seeking) communication network for teachers in School 4. (see Figure 2 for key to symbols)
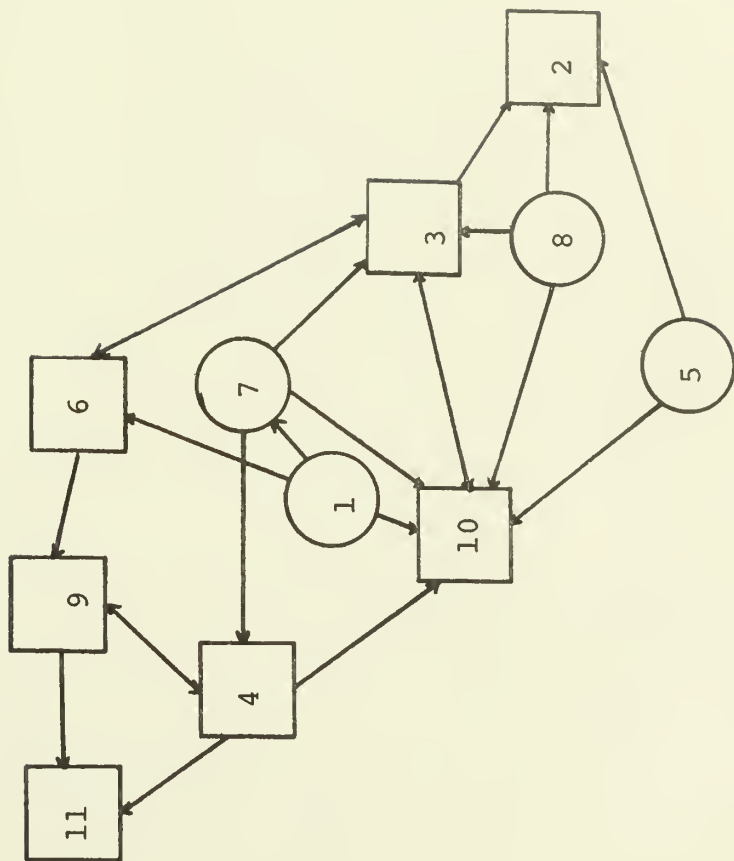
Figure 5. Sociogram of (advice-seeking) communication network for teachers in School 5. (see Figure 2 for key to symbols)
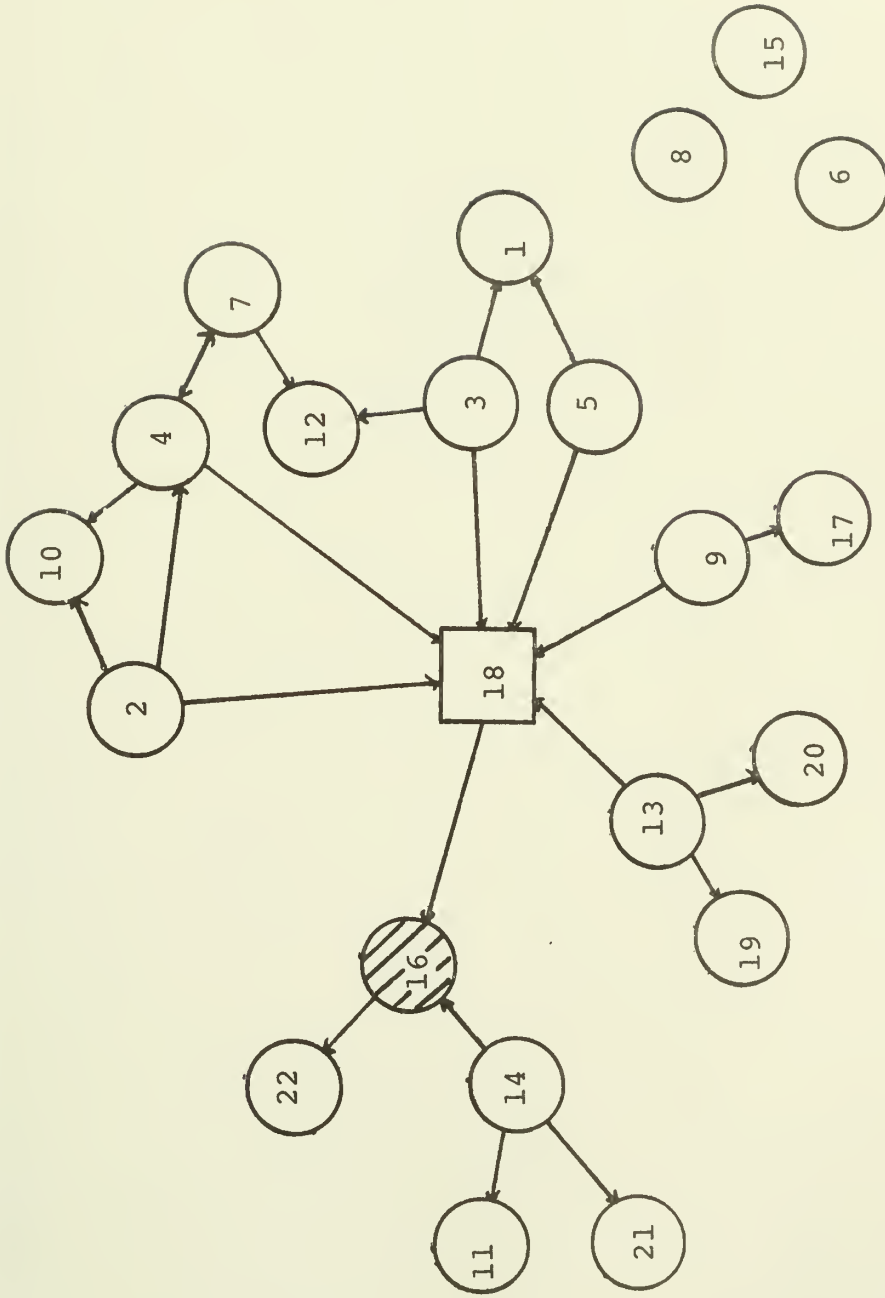
Figure 6. Sociogram of (advice-seeking) communication network for teachers
in School 6. (see Figure 2 for key to symbols)

were evident. In order to gather more rigorous evidence regarding any differences, several indices (cf. Lin 1968) were employed.

Number of isolates. An isolate has been previously defined as a teacher who neither nominated nor was nominated by any other teacher (Lin 1968). Schools 3 and 6 each had three isolates, School 4 had two, School 1 had one and there were none in School 5.

Number of minor cliques. A minor clique has been defined as a subgroup of teachers who had no connection with the major clique (Lin 1968). School 3 had one minor clique.

Number of opinion leaders. An opinion leader has been defined as a teacher who was nominated by more than 10% of his colleagues (Lin 1968). In these calculations, an opinion leader was counted as such only if the number of other teachers nominating him total more than the larger whole number (rounding up), e.g., in a group of 24 teachers, 3 would need to nominate teacher A in order for him to qualify as an opinion leader. School 5 had seven opinion leaders (teachers 10, 4, 11, 9, 6, 3 and 2 in Figure 5). School 1 had six (teachers 1, 12, 3, 4, 21 and 25 in Figure 2). School 4 had three (teachers 30, 33, and 35 in Figure 1). School 3 had three (teachers 26, 22, and 2 in Figure 3). School 6 had one (teacher 18 in Figure 6).

Number of primary and secondary liasons. A primary

liason was defined as a teacher whose absence from the group
structure would break one connected group into at least two
separated subgroups, each consisting of at least two tea-
chers (Lin 1968). A secondary liason was defined similarly
but required pairing with another teacher in order to effect
the separation of the subgroup(s). In placing individuals
into any of these classifications, once an individual is
designated (e.g., opinion leader), he cannot subsequently
be placed in any other classification (e.g., primary liason).
School 5 had no liasons of either type. In School 3, tea-
chers 13, 19 and 20 were primary liasons. In School 6,
teacher 16 was a primary liason. Teacher 8 was a primary
liason in School 4, and teachers 6 and 31 were secondary
liasons. In School 5, teachers 5 and 20 were secondary
liasons.

The foregoing discussion has focused on some basic
characteristics of communication networks. The structures
in the five schools have been differentiated in terms of
isolation, minor cliques, opinion leaders, and liasons
whose absence from the structure would inhibit the communi-
cation process. Next, we will examine indices of teachers'
prestige within the communication network and see if these
indices are consistent with the indicators of innovative-
ness presented previously.

Influence domain, centrality and prestige. A teacher

who seeks advice from another teacher is obviously influenced to some extent by that teacher. Thus, when teacher A goes to teacher B for advice, B exerts influence on A. The sociograms in Figures 2 - 6 indicate these relationships by the direction of the arrows. For two teachers not otherwise connected (e.g., teachers 15 and 28 in Figure 3), the influence exerted is the direct influence one has on the other. However, when these individuals are linked to one or more other individuals, the indirect influence of these additional individuals is present as well. In the simplest case, teacher A goes to teacher B, and teacher C goes to teacher A. Here, in addition to the direct influence teacher B is exerting on teacher A, there is the indirect influence teacher B is exerting on teacher C. This can be illustrated as C→A→B where the direction of the arrow is the direction of advice-seeking and the indication of influence flow (e.g., back along the stem). Therefore, influence domain is defined as the number of teachers to whom he (a given teacher) provided advice upon request or whom he influenced indirectly (Lin 1968). For an isolated individual, the influence domain would be zero, for a connected individual it would approach the number of members in the group of which he was a member.

In order to determine the influence domain of the teachers, a distance matrix was necessary. A distance matrix

consists of a series of cells, each containing either a positive number indicating the number of chains in the shortest influence route between any given teachers, or a 0 (significant infinity) if no such route exists. Matrix multiplication applied to the incidence matrix depicting the communication network produces such a matrix. To obtain this matrix for the present study, the incidence matrix for each of the five schools was prepared as input to a computer program operationalized at Johns Hopkins Computing Center and supplied to the author by Dr. Nan Lin. The program was originally written for use on IBM 7094 but needed only the substitution of one system card to run on the CDC 3600 at the University of Massachusetts Computing Center. The output of the program consists of (1) the distance matrix for each element (2) the influence domain of each element (3) the centrality of each element (defined as the sum of all chains in the influence domain divided by the influence domain) (Lin 1968) and (4) the prestige of each element. The incidence matrices of the five schools were fed into the program to determine items 2, 3, and 4 above. The results are presented in Appendix E.

The _prestige_ of a teacher was defined as the influence domain divided by the product of his (given teacher) centrality and the number of other teachers (N-1) (Lin 1968). The range of this index is from 1 (most prestigious) to zero

(least prestigious). Computational procedures per Lin (1968) which were used in the present study are presented in Appendix G.

The influence domain, centrality, and prestige of the opinion leaders in each of the five schools is presented in Table 31. Due to the generally high cohesiveness in these five schools, the influence domain for each teacher tends to approximate the total number of teachers in the school. This results in no variability except for isolated teachers who have an influence domain of zero. The results in School 5 (where one opinion leader obtained a phenomenol 0.909 prestige index) should probably be discounted for two reasons -- first, the size of the group is half that of the other schools, and second, it will be recalled that School 5 is a parochial school with no lay teachers. It is likely that this underlying bond artificially inflates the measures used here relative to public schools. After School 5, it is clear that the opinion leaders in School 4 enjoy greater prestige than those in the other schools. In all cases, the prestige indices obtained are above .250, signifying relatively high prestige overall. In light of the foregoing discussion, what can be said about specific hypotheses?

Hypothesis 13. Schools which have many opinion leaders will be more innovative. Disregarding School 5 for the reasons cited above, it will be recalled that School 1 had the

Table 31

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE OF OPINION LEADERS

| Opinion leader | Communication indices | | |
	Influence domain	Centrality	Prestige
School 5 (N = 11)			
Teacher 10	10 (90%)	1.10	0.909
Teacher 3	10 (90%)	1.50	0.667
Teacher 2	10 (90%)	1.70	0.588
Teacher 11	10 (90%)	2.30	0.435
Teacher 9	10 (90%)	1.60	0.625
Teacher 6	10 (90%)	1.60	0.625
Teacher 4	10 (90%)	1.60	0.625
School 1 (N = 29)			
Teacher 4	27 (93%)	3.00	0.321
Teacher 25	27 (93%)	2.89	0.334
Teacher 12	27 (93%)	2.74	0.352
Teacher 3	27 (93%)	2.59	0.372
Teacher 1	27 (93%)	2.63	0.367
Teacher 21	27 (93%)	3.19	0.303
School 4 (N = 39)			
Teacher 30	36 (92%)	1.47	0.644
Teacher 33	36 (92%)	1.64	0.578
Teacher 35	36 (92%)	2.50	0.379
School 3 (N = 29)			
Teacher 26	23 (79%)	2.78	0.295
Teacher 22	23 (79%)	2.48	0.331
Teacher 2	23 (79%)	3.04	0.270
School 6 (N = 22)			
Teacher 18	18 (82%)	1.67	0.514
School 2*			

* In School 2, individual teachers could not be identified, therefore these characteristics could not be determined.

largest number of opinion leaders with six and Schools 3 and
4 each had three. It will also be recalled that School 1
ranked first on Innovativeness$_1$ (time of awareness) and Inno-
vativeness$_2$ (time of adoption), while School 4 ranked first
on Innovativeness$_3$ (innovation internalization) and Innova-
tiveness$_4$ (change orientation). School 3 ranked at or near
the bottom on all measures of innovativeness, though it had
three opinion leaders. This fact would appear to weaken
the otherwise strong support of Hypothesis 13. A possible
mediation of this weakening effect may evolve from the dis-
cussion of Hypotheses 14 and 15.

Hypothesis 14. Schools where the opinion leaders enjoy
greater prestige will be more innovative. Again, it seems
necessary to exclude School 5 from the discussion. Its
unique situation brings into question the comparability of
the measures obtained there. Of the remaining schools, the
prestige obtained by the opinion leaders is highest in
School 4, followed by Schools 6, 1 and 3. We see here that
even though School 3 has as many opinion leaders as School
4, they do not enjoy nearly so much prestige. Indeed, the
highest prestige score in School 3 is 0.331 which is less
than the lowest score obtained by a teacher in School 4
(0.379). Thus, it is clear that numbers alone are not suf-
ficient. The intermediate rank for School 6, whose opinion
leader enjoys less prestige than his counterparts in School

4, but more prestige than those in School 1, confounds the support for Hypothesis 14, and it must be concluded that the specific hypothesis is only weakly supported.

Hypothesis 15. Schools which have fewer isolates, minor cliques, and primary and secondary liasons will be more innovative. As has been noted earlier, the presence of these elements in a communications network sharply increases the likelihood of a breakdown and of potentially high communication cost. Such characteristics are intuitively antithetical to the sort of setting needed for innovation to flourish. School 3 is in very poor shape on this count, having three isolates, three primary liasons and a minor clique. It is reasonable to conclude that its low rank on the innovativeness measures is related, at least partially, to these negative features of its communications network. School 1 had one isolate and a pair of secondary liasons. School 4 has two isolates and one primary liason. This may account for School 1's stronger showing on Innovativeness$_1$ (time of awareness), the measure most likely to be affected directly by communication phenomena which are a necessary prelude to adoption of any innovation. Thus, we may conclude that there is some support for the hypothesis that the fewer "costly" characteristics present in a communication network, the more innovative it will be. A comparison of the structural properties in the six schools is presented in Table 32.

Table 32

COMPARISONS OF STRUCTURAL DIFFERENCES IN THE SIX SCHOOLS

Structural property	School 1 N = 29	School 2 N = 24	School 3 N = 29	School 4 N = 39	School 5 N = 11	School 6 N = 22
Number of opinion leaders	6(21%)	NA**	3(10%)	3(8%)	7(64%)	1(5%)
Number of isolates	1(3%)	NA	3(10%)	2(5%)	--	3(15%)
Number of minor cliques	--	NA	1(3%)	--	--	--
Number of primary liasons	--	NA	3(10%)	1(2%)	--	1(5%)
Number of secondary liasons	2(6%)	NA	--	2(5%)	--	--
Maximum influence domain obtained by a teacher	27*** (93%)	NA	23*** (79%)	36*** (92%)	10*** (90%)	18*** (82%)
Maximum prestige obtained by a teacher*	0.372	NA	0.331	0.644	0.909	0.514

* The maximum possible prestige was 1.00.
** In School 2, individual teachers could not be identified, therefore these characteristics could not be determined.
*** In all schools, teachers who were nominated but who did not complete a question-naire were nonetheless included in this computation.

Summary of findings for Hypotheses 12 - 15. The analysis employed in the testing of Hypotheses 12 - 15 was simple description of and logical deduction from the data presented. Partial support was found for Hypothesis 12. The findings for Hypotheses 13 - 15 were somewhat intertwined and were further confounded by the unique circumstance of School 5 -- a small parochial school which exhibited a uniquely connected communication network. In the main, inspection of the sociograms and the results of computations based on the sociograms lent partial support to some generalizations about the posited relationships. The implications of these findings will be discussed in Chapter IV.

Other Findings

Self-perceived opinion leadership. Although not included in the hypotheses investigated, the data yielded additional information about opinion leaders which was examined. It will be recalled that Hypotheses 13 and 14 posited relationships between the number and prestige of opinion leaders and innovativeness. Testing of these hypotheses involved consideration of responses to a sociometric item soliciting nomination of colleagues from whom advice was sought by the respondents. This information was classified into several structural properties via a procedure suggested by Lin

(1968).   The opinion leaders who were designated as a result
were those perceived by other members of the school.   Of
interest here is the extent to which these designated indi-
viduals perceive themselves as opinion leaders, that is,
individuals from whom others in their school seek advice.

A six-item scale adapted from Rogers (1962) was inclu-
ded in the questionnaire in an effort to assess the respond-
ent's self-perceived opinion leadership.   The six items
making up this scale were as follows:

1.   During the past six months, have you told anyone
     in your school about any new educational practices?

     1.   No   2.   Yes

2.   Compared with your circle of friends in the school,
     are you usually more or less likely to be asked
     for opinions about educational practices?

     1.   more
     2.   less

3.   Thinking back to the last time you discussed a
     new educational practice, were you asked for your
     opinion or did you ask someone else for theirs?

     1.   I was asked
     2.   I asked someone else
     3.   both

4.   When you and your colleagues discuss new ideas
     about education, what part do you usually play?
     mainly listen or try to convince them of your
     ideas?

     1.   mainly listen
     2.   try to convince
     3.   some of each

5. Which of these happens more often? You tell your
    colleagues about some new educational practice, <u>or</u>
    they tell you?

    1. I tell them
    2. They tell me
    3. about fifty-fifty

6. Do you have the feeling that you are generally
    regarded by your colleagues as a good source of
    advice about new educational practices?

    1. No   2. Yes

Responses to the items were first transformed to make them

consistent and them summed into a composite score with a

theoretical range of 6 to 18. The lower the numerical score

an individual received, the greater his self-perceived

opinion leadership. Correlation of the individual items

with the composite score ranged from 0.347 to 0.670. Inter-

item correlations ranged from 0.4990 to -0.2529. The resul-

ting scores were then examined in a variety of ways.

First, self-perceived opinion leadership was entered

into multiple regression equations to determine its rela-

tionship to the four measures of innovativeness employed in

the study. (For a complete summary of the regression equa-

tions, refer to Tables 11 - 14, pp. 66-73.) The analysis

revealed that self-perceived opinion leadership was indeed

related to Innovativeness$_1$ (time of awareness), Innovative-

ness$_2$ (time of adoption), Innovativeness$_3$ (innovation inter-

nalization), and Innovativeness$_4$ (change orientation).

Significant beta weights were obtained in each instance (b =

.773; t = 3.5282; p < .01; b = -.321; t = 2.8346; p < .01;

$b = -.474$; $t = 3.5746$; $p < .01$; $b = -.299$; $t = 1.9860$; $p < .05$ respectively). The relative importance of the variable in each equation is summarized and presented below in Table 33.

Table 33

RELATIVE IMPORTANCE OF SELF-PERCEIVED
OPINION LEADERSHIP IN PREDICTING INNOVATIVENESS

Variable	I_1*	P	I_2*	P	I_3*	P	I_4*	P
21 Opinion leader-ship score (self-perceived)	16**	<.01	7**	<.01	10**	<.01	15**	<.05

    * see footnote Table 15
   ** see footnote Table 15

Next a school mean was calculated. The results are shown in Table 34.

Table 34

SELF-PERCEIVED OPINION LEADERSHIP SCORES
FOR THE SIX ELEMENTARY SCHOOLS

	Mean Score	Standard Deviation	Range
School 1 (N = 23)	9.57	1.47	6-12
School 2 (N = 24)	9.42	1.91	2-12
School 3 (N = 23)	10.09	1.24	0-12

Table 34 (cont.)

	Mean Score	Standard Deviation	Range
School 4 (N = 32)	9.97	0.97	0-12
School 5 (N = 9)	9.22	1.30	7-11
School 6 (N = 17)	10.06	1.34	8-12
Schools 1-6 (N = 128)	9.77	1.40	0-12

So little between schools variability was noted here that no further analysis by school was done. Instead, a closer inspection of the scores of individual opinion leaders identified by the sociometric item was called for. A plausible formulation which guided this inspection was that the peer-perceived (via the sociometric item) opinion leaders should exhibit relatively high (numerically low score) self-perceived opinion leadership. The results are presented in Table 35.

Table 35

SUMMARY OF PEER PERCEIVED OPINION LEADERS
AND THEIR SELF-PERCEIVED OPINION LEADERSHIP SCORES

Peer perceived opinion leader	Self-perceived opinion leadership score
School 1	
Teacher 3	9

Table 35 (cont.)

Peer perceived opinion leader	Self-perceived opinion leadership score
Teacher 4...........................	7
Teacher 1...........................	8
Teacher 12..........................	8
Teacher 25..........................	NA*
Teacher 21..........................	10
School 2	NA**
School 3	
Teacher 2...........................	10
Teacher 22..........................	11
Teacher 26..........................	NA*
School 4	
Teacher 30..........................	10
Teacher 33..........................	10
Teacher 35..........................	NA*
School 5	
Teacher 10..........................	NA*
Teacher 11..........................	NA*
Teacher 9...........................	9
Teacher 7...........................	9
Teacher 6...........................	8
Teacher 4...........................	11
Teacher 3...........................	9
School 6	
Teacher 18..........................	NA*

* Data from these individuals were not available.
** Sociometric data were not available for School 2, therefore no opinion leaders could be identified.

All of the scores obtained fell at or below the midpoint for the scale. Thus, it can be concluded that for these opinion leaders there was congruence between their perceptions of themselves as opinion leaders and the perceptions of their colleagues.

Role identity of opinion leaders. Closer examination of the identity of the opinion leaders in each school resulted in a most interesting finding. In every school, either the principal, the assistant principal, or a person whose role was primarily a non-teaching one was identified as the opinion leader receiving the greatest number of nominations! In School 1, "teacher" 25 is the guidance specialist. In School 3, "teacher" 26 is the assistant principal. In School 4, the most significant example of this phenomena, "teacher" 30 is the assistant principal (also called head teacher in this case), "teacher" 33 is the principal, and "teacher" 35 is the audio-visual specialist. In School 5, "teacher" 10 is the principal, as is "teacher" 18 in School 6. (The reader is referred to Figures 2 - 6, pp. 96-100 for a review of the sociograms for the schools.) It will be recalled that School 4 ranked first on Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change orientation). It would seem reasonable to conclude that there is a connection between the fact that School 4 is the "most" innovative, at least on two measures of innovativeness, and that

its opinion leaders are also the recognized leaders of the
formal organization. The implications of these findings
will be discussed in Chapter IV.

C H A P T E R IV

CONCLUSIONS

Summary

Previous studies of the diffusion of innovations and innovativeness have suffered from two major limitations. First, most studies have focused on either the individual as an independent adopter (eg. farmers or doctors) or have considered situations in which diffusion between organizations was the locus of interest. Second, previous measures of innovativeness have generally been restricted to a consideration of how long ago the individual or organization adopted a given innovation. Relatively early (in time) adoption was considered to be indicative of innovativeness. Recognition of the above limitations led certain authors, primarily Lin (1966a, 1966b, 1968) and Rogers (1968), to explore an expanded definition of innovativeness combined with the analysis of within-group diffusion of an innovation.

The present study was an attempt to build upon their prior work in this area of inquiry by exploring the nature of various indicators of innovativeness and the relationship of selected characteristics of intact groups to the indicators. Broadly stated, the study attempted to answer the question:

What is the relationship between selected characteristics of intact groups and their innovativeness?

The answer to this question was sought through the testing of fifteen hypotheses:

Hypothesis 1. Faculty who are younger will be more innovative.

Hypothesis 2. Faculty who have more education will be more innovative.

Hypothesis 3. Faculty who earn more will be more innovative.

Hypothesis 4. Faculty who have taught fewer years in total will be more innovative.

Hypothesis 5. Faculty who have taught more years in a given school will be more innovative.

Hypothesis 6. Faculty who perceive an innovation's advantages as outweighing its disadvantages will be more innovative.

Hypothesis 7. Faculty who perceive an innovation as benefiting their students will be more innovative.

Hypothesis 8. Faculty who perceive an innovation as being received enthusiastically by their students will be more innovative.

Hypothesis 9. Faculty who perceive that they have greater decision-making power over the adoption of an innovation will be more innovative.

Hypothesis 10. Faculty who perceive the norms in their school favoring innovators will be more innovative.

Hypothesis 11. Faculty who indicate a greater awareness of new practices will be more innovative.

Hypothesis 12. Schools which have a high degree of communication between early and late knowers will be more innovative.

Hypothesis 13. Schools which have many opinion leaders will be more innovative.

Hypothesis 14. Schools where the opinion leaders enjoy greater prestige will be more innovative.

Hypothesis 15.   Schools which have fewer isolates,
                  minor cliques, and primary and secon-
                  dary liasons will be more innovative.

The sample for the study consisted of six elementary
schools in Massachusetts, organized either K-5 or K-6, which
reported having adopted team teaching within the past two
years. All schools were members of the Network of Innova-
tive Schools that had agreed to participate in a research
study. Questionnaires were administered to the staffs of
the six schools (N=130) in group meetings and the data so
obtained served as the basis for the analysis.

The analysis of this research focused on the main
effects of the variables specified in the hypotheses on
the four measures of innovativeness--Innovativeness$_1$ (time
of awareness), Innovativeness$_2$ (time of adoption),
Innovativeness$_3$ (innovation internalization), and
Innovativeness$_4$ (change orientation). The effect of school
was included as a control variable. In those cases where
the individual was the unit of analysis (Hypotheses 1-11),
the answer to the question concerning the importance of the
independent variables as predictors of innovativeness was
sought through multiple regression analysis. In those
cases where the school was the unit of analysis (Hypotheses
12-15), the answer to the question was based on logical
conclusions from the data obtained.

The analyses performed in this investigation provide
mixed support for the posited relationships. It is clear

that we are dealing with a very complex concept--innovative-
ness--one whose many facets are extremely elusive. In no
case were any of the independent variables as specified in
the hypotheses significantly related to all of the measures
of innovativeness employed. (The number of disadvantages
of team teaching cited and self-perceived opinion leader-
ship score were significantly related to all four measures
of innovativeness although they were not included as specif-
ic research hypotheses.)

The number of independent variables (or subvariables)
which were significantly related to each of the four measures
of innovativeness was of interest. In all, twelve were sig-
nificantly related to Innovativeness$_1$ (time of awareness).
These were teaching income, non-teaching income, years of
teaching (total), years of teaching (in a given school),
number of disadvantages, number of advantages, perceived
benefit to students, perceived student attitude toward the
innovation, perceived student receptivity to the innovation,
perceived decision-making power, norms--attitude toward inno-
vators, and information level regarding new practices.

Surprisingly, only three variables (or subvariables)
were significantly related to Innovativeness$_2$ (time of adop-
tion). These were years of teaching in a given school, num-
ber of disadvantages, and number of advantages.

Six variables, teaching income, years of teaching (total),
number of disadvantages, perceived benefit to students, norms--

attitude toward innovators, and information level re new practices, were found to be significantly related to Innovativeness$_3$ (innovation internalization).

Innovativeness$_4$ (change orientation) had eight varaiables which were related to it. These were age, number of disadvantages, number of advantages, perceived benefit to students, perceived student attitude toward the innovation, perceived student receptivity to the innovation, perceived decision-making power, and norms--attitude toward innovators.

These findings suggest that, at least in this context, time of adoption is not a very useful indicator of innovativeness and that pursuit of the other indicators of innovativeness, especially innovation internalization and change orientation, would be far more fruitful.

Corroboration of this notion was provided by an examination of the communication network within each school. By constructing a sociogram of each teacher group and identifying certain structural characteristics, such as the number of opionion leaders, isolates, minor cliques, and primary and secondary liasons, which differentiated the schools one from another, it was possible to determine the relationship of the communication patterns and the group structure to a school's innovativeness. Hypotheses 12-15 were directed at testing these relationships.

School 4, which had ranked first on Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change

orientation) possessed certain structural characteristics
which seemed to bolster its ranking as "the most innova-
tive" school, according to two measures of innovativeness.
School 4's two major opinion leaders, both of whom received
an extremely large number of nominations, turned out to be
the principal and the assistant principal! Their espe-
cially strong showing, together, set them apart from the
other schools, which also had the principal or other adminis-
trative person as the major opinion leader. The importance
of these two individuals in the advice-seeking communica-
tion network of the school is dramatically evident in the
sociogram for School 4 (see Figure 4, p.98). A possible
explanation for School 4's poorer relative showing on the
other two measures of innovativeness is presented in the
Discussion section of this chapter.

The phenomena of finding the principal and other admin-
istrative staff of the schools identified as the opinion
leaders has been noted in passing above. This finding seems
to have such tremendous import for educational change that
it bears reiteration: In all five of the schools for which
data allowing this analysis was available (data from School 2
was not available), the opinion leader receiving the great-
est number of nominations was either the principal, the
assistant principal, or, in one case, the guidance specialist.

Additional other findings suggest that the opinion
leaders as designated by their peers in the school also saw

themselves as opinion leaders. The congruence between these
two perceptions was revealed by a comparison between the
nominations made in response to a sociometric item and the
designated opinion leaders' scores on a self-perceived
opinion leadership scale. This scale, it will be recalled,
was found to be significantly related to all four measures
of innovativeness employed in the present study.

These findings reaffirm, but by no means make crystal
clear, the multidimensionality of the concept of innova-
tiveness. The relationships posited in the hypotheses
exist, to one degree or another, depending on which facet
of innovativeness is measured in a particular context. A
formulation that attempts to make some sense of the fore-
going is presented in the next section.

Discussion of the Findings

Knowledge of some basic principles of communication
theory, learning, and attitude change coupled with the
acceptance of some assumptions regarding the validity of
the concepts under consideration in the present study
provide the beginnings of a plausible explanation of the
phenomena evidenced by the data. It is the author's conten-
tion that (1) School 4 is the most innovative, (2) that it
possesses characteristics which should be emulated by other
schools, and (3) that this set of findings, taken as a whole,

constitute the most significat aspect of this study in terms of future educational change efforts.

The assumptions which must be accepted are as follows. First, that the concept of a generalized change orientation, that is, a positive predisposition toward change and innovation, exists in some people and can be measured using the scale employed in this study. This concept of change orientation is not time-specific. Next, that the internalization of the importance of the use of a particular innovation to one's role performance is a viable concept, and further, that it can be measured using the scale employed here. This concept is time and situation specific. That is, an individual will vary in the extent to which he has internalized one innovation compared to another in a given situation.

Diffusion theory, as well as basic rationality, would assume that awareness (of an innovation) must preceed its adoption, at least in a theoretical sense. If the foregoing is accepted, it is reasonable to postulate a time sequence such as that depicted below:

Change orientation - Awareness - Adoption - Internalization

TIME

Obviously the process is neither linear nor isolated in

practice, but consideration of the cyclical nature of atti-
tude formation and its interrelationship with the myriad
aspects of a larger environment is beyond the scope of this
discussion.

Placing these factors, identified as indicators of
innovativeness, on a simplified time line gives an appre-
ciation of the difficulty in attempting to interpret all of
them simultaneously, even when the interpretation is organ-
ized around a single focus--in this case, team teaching.
The interaction between the factors is likely to confound
the interpretation, even though the factors may be concept-
ually separate.

In the present study, an additional factor may be at
work as a confounding variable. In the situation under con-
sideration, team teaching was used as the vehicle for
obtaining indications of innovativeness. The vast majority
of the sample population reported that the decision to
adopt team teaching or not was one over which they exerted
completely individual control. This state of affairs is
diametrically opposite to that cited by Lin (1966b) wherein
the decision to adopt flexible scheduling was one over which
the teachers had virtually no influence. In that context,
Lin found time of adoption to be a meaningless variable.
The same may be true in the present study, but for entirely
opposite reasons. Indeed, this may explain the fact that
of the independent variables investigated, only three were

found to be significantly related to Innovativeness$_2$ (time of adoption). On this basis, it can be concluded that the meaningfulness of time of adoption is vitiated in this context, and the fact that School 4 ranks third on that measure of innovativeness is of little import. But what about time of awareness, a measure of innovativeness on which School 4 ranked fourth?

A ready explanation is available for these results as well. Team teaching was first introduced almost fifteen years prior to the present data collection effort. Further, its introduction occurred in a school in Massachusetts. It is reasonable to conclude then, that teachers who were (1) older and (2) had been in the profession longer would be far more likely to have heard of team teaching, even if they hadn't adopted it, than younger teachers who only recently entered teaching. An examination of these factors for teachers in School 1, ranked first on Innovativeness$_1$ (time of awareness), revealed that they were indeed older (57% were over 40) and had been teaching longer (60% over 11 years) than the teachers in School 4, 45% of whom were under 30 years of age and 63% of whom had taught less than 6 years. Certainly these factors had more than a little effect on the schools' relative rank on awareness of the innovation.

The above discussion has been directed at supporting the contention that the two attitudinal indicators of innovativeness--Innovativeness$_3$ (innovation internalization) and Innovativeness$_4$ (change orientation) were, in this context, the most meaningful criteria for determining which school was the "most" innovative, and that by applying these criteria, School 4 was indeed number one. The fact that School 4's major opinion leaders were the principal and assistant principal, chosen from a rather cohesive communications network, seemed, subjectively of course, to be an additional positive factor. Of course a basic assumption underlying everything that has been said thus far is that innovativeness is "good", and that team teaching is a desireable practice to employ. One could speculate that School 4 is a fluke--that its relatively young and inexperienced staff are being "hoodwinked" by a powerful and influential principal-assistant principal team into thinking team teaching is nothing short of fantastic. This alternate explanation cannot be discounted directly in the case of Innovativeness$_4$ (change orientation). However, we know that specific experiences (eg. the adoption, use and internalization of team teaching) become generalized as part of an individuals' general response set (cf. change orientation). Thus if we can negate the appeal of the alternate explanation in the case of Innovativeness$_3$ (innovation internali-

zation), which is situation specific, perhaps we can gen-
eralize to change orientation as well. As it happens, data
is available which does just that.

If the situation in School 4 was uniquely rosy, (or
for that matter was not but was reported to be), and/or
if the staff had been sold a bill of goods by the administra-
tion, two things might occur. First, a sizeable number of
the staff would not have adopted team teaching, since it
was a decision essentially in their individual control.
Second, their report of the advantages of team teaching would
heavily outweigh the reported disadvantages. A reinspection
of the relevant data indicates that neither is the case.

Regarding adoption of team teaching, less than 10% of
the teachers report non-adoption. In fact, School 4 leads
all the schools on percentage adopting team teaching (see
Figure 1, p. 57 for the complete data). Well, one might
say, they surely must think it is great. And indeed they
do. School 4 teachers report an unmatched 79 advantages,
more than twice as many as the next highest school. How-
ever, School 4 teachers also report the greatest number of
disadvantages--41. What does this mean?

Despite conventional wisdom and the preponderance of
educational practice, it is a well-researched fact that an
individual is more likely to retain an initial decision if
he has considered both the positive and negative aspects of

it prior to drawing a conclusion. Such seems to be the
case here, where it seems that both the pros and the cons
of team teaching have been thoroughly considered by the
teachers in School 4. Of particular interest is the fact
that the ratio of the total number of mentions for both
advantages and disadvantages to the number of staff is
almost 4:1. This would seem to indicate a depth of under-
standing which, when coupled with the high percentage of
adoption, would seem to offer a plausible explanation for
the number one ranking on Innovativeness$_3$ (innovation inter-
nalization) attained by School 4.

Independent corroboration of the author's position
that School 4 is the outstanding school was offered by find-
ings cited in McKay's (1971) study of elementary school
environments and organizational climates. Based on previous
research, that study postulated several parameters of an
ideal educational environment as seen by a school's students.
Of the thirty-six schools included in the population sample,
McKay identified two schools which met the requisite cri-
teria for an ideal environment. School 4 of the present
study is one of these two schools. Further, the study
compared the teacher-principal interaction as measured by
the Organizational Climate Description Questionnaire and
found high congruence among the two schools, indicating
that perhaps there is a "most desireable" range for these

factors as well. Thus, it was concluded that ideal educa-
tional environments and certain teacher-principal inter-
actions go hand in hand. It is reasonable to conclude that
data examined in the present study present certain aspects
of this "desireable" teacher-principal interaction. The
most obvious of these is the high regard teachers have for
the principal as a source of helpful advice. He, along
with the assistant principal, is at the center of a rather
cohesive communication network. It is clear that he is
intimately involved in all of the activities of the school,
and that this involvement is not viewed as obtrusive by
the teachers. A further indication of this positive teacher-
principal interaction is the relatively high prestige he
enjoys within the group. Intuitively, it would appear
that these factors have a substantial effect on the learning
environment in the school. The implications of the findings
and recommendations for future research are explored in
the following subsections. (The reader is referred to
Appendix F for the relevant excerpts from the McKay (1971)
study. School 4 is the same in both cases.)

Implications for Action

The findings in this study must be viewed in light
of how they might affect future educational change efforts,
in these six schools as well as in schools in general.
One implication of the finding that the perceived benefit
to students, as well as their attitude and receptivity to
an innovation, in this case, team teaching, was related to
the change orientation and the time of awareness of the
teachers is that individuals introducing new practices into
schools should strive to demonstrate the innovation's po-
tential appeal and benefit to the students. Linked to this
was the complementary finding that the number of advantages
and disadvantages perceived was related to these same two
indicators of innovativeness. It will be recalled that the
simple time sequence presented in the previous section pos-
tulated a sequence starting with change orientation and
proceeding through time of awareness, adoption and finally,
internalization. It is interesting to note that the number
of advantages and disadvantages was also related to time
of adoption. Despite the questionable meaningfulness of
this innovativeness indicator in this study, adoption (of
an innovation) most certainly must occur (or not occur) in
a given setting. The most important aspect of this action
is its effect on the innovation's eventual fate. Simple

adoption, or compliance, is not likely to be sufficient assurance that a given innovation will even survive, let alone thrive. Something more is called for. That something has been postulated to be innovation internalization.

To the extent that the use of a given innovation has been internalized, it is likely that the adoption is a functional one, rather than simply a ceremonial one. The importance of such functional adoption of an innovation to the success of any planned change effort is obvious. Hence, the finding that perceived benefit to students and number of disadvantages were also significantly related to internalization serves to emphasize their inclusion as key variables. The reality perspective from which it can be assumed these variables derive would imply that while advantages are necessary elements prior to adoption, it is the forthright balancing of these with disadvantages which results in the ultimate acceptance and use of an innovation. Similarly, although perceived enthusiastic student attitude is necessary to encourage initial adoption, it is not likely to be enough to sustain it without some evidence of more tangible student benefit.

The inclusion of information level re new practices as a variable significantly related to both time of awareness and internalization would seem to reaffirm the widely held view that a continued influx of new information must be

sustained in order for innovativeness to be nurtured.

The pervasive importance of group norms, measured by
the attitude toward innovators, suggests that attention
must be paid to those tangible and intangible cues in a
school which seem to favor innovation. Thus, a school
might profitably explore some sort of reward structure
which would go far toward establishing progressive norms
within the school. Despite the fact that teaching income
and years of teaching were significantly related to innov-
ation internalization, they do not seem likely vehicles for
this type of reward system. It seems likely that their
relation here is due to the security level reached by those
teachers employed longer and earning more money. These
basic needs, once filled, would seem to provide the safe
corner from which to venture forth and innovate. It is
doubtful that the relationship is linear in any case, and
we have no simple way to determine the point after which
diminishing returns result. As has been noted previously,
even if we did know the answer to the foregoing question,
we couldn't do anything about it - teachers are tenured,
and as each year ticks by, they get more money, all other
things being equal.

The implications put forward thus far either relate
to the need for a communication vehicle or are the result
of one. So it is easy to see the potential importance of

having a "road map" of the group prior to attempting to introduce a change. Certain features of a communication network, such as those depicted in Figures 2-6 (pp. 96-100) determine how costly any communication is likely to be. An examination of the implications of the network in each school for any future action in that school should make these generalizations more concrete.

Any attempt to introduce an innovation into School 1 should not only attend to the opinion leaders as prime targets for persuasion efforts but should not fail to take into account that the absence of teachers 5 and 20 would cut off a significant portion of the faculty from input. In general the structure is overly reliant on one-way links, and over thirty percent of the staff have only one source for their advice. Steps should be taken to bring the teachers as a group into more situations where sharing would be likely to occur. Perhaps a special time needs to be put aside each week solely for this purpose. There is no a priori reason that "show and tell" should be restricted to second graders.

School 2, as has been noted before, is an unknown quantity in this regard. Certainly the unusual reluctance of the teachers to cooperate with the researcher sets this school apart from the others in the study. It would be unfair to speculate any further about possible contributing

factors, but it is obvious that a severe problem exists
which the responsible administrators should attend to.

School 3 has perhaps the most potentially costly
structure of all the schools. Teachers 10, 11, and 21 are
completely isolated. Teachers 15 and 28 form a two member
clique with no connection to the main group. Even more
dangerous, teacher 20 is the sole link with the major clique
for almost half of the remaining teachers. Teacher 19 and/
or 13, if absent, cut that secondary group in two. These
factors would indicate that a good number of the teachers
have little or no idea what their colleagues are doing.
Certainly there is a practical limit to how much information
teacher 20 can carry from one group to the other. School
3's rank at or near the bottom on all indicators of innov-
ativeness would seem to lend support to the notion that the
potentially costly communication network would be unlikely
to foster innovation. The low prestige enjoyed by the
opinion leaders is another bad sign. The responsible people
should move to bring in the isolated members and plan a
strategy to produce more linkage between the two large sub-
groups. Perhaps teacher 26 could be approached to consider
making overtures to the primary liasons - teachers 13, 19,
and 20 as a first step toward building a cohesive group. It
will be recalled that this individual(26) is the assistant
principal, so his mobility within the group is certainly not

an inhibiting factor. Although the above are not as obvious danger signs as in School 2, the potential impact of this borderline situation on the long-term success or failure of the school to maximize its effectiveness is every bit as evident.

Perhaps enough has been said already about School 4. Though not the most cohesive of the schools, it seems to possess some features which have worked together to generate an innovative school. Not only does it have more than one opinion leader, but all of the opinion leaders enjoy relatively high prestige. The absence of either the one primary liason (teacher 8) or the two secondary liasons (teachers 6 and 31) would cut off less than ten percent of the teachers. The identity of one of the isolates is unknown, but the other is not a regular teacher. Nonetheless, it would seem desireable to integrate them into the group. Good things are happening in School 4 which should be shared with other schools. How did the principal(30) and the assistant principal(33) come to be so highly regarded by their staff? Are there features to the situation which are unique to this school and cannot be generalized? Questions like these need to be asked, for the answers might go a long way toward helping other schools move closer to being innovative.

School 5 is indeed unique among this group of schools.

As the only parochial school included it seems likely to possess underlying characteristics that interact with its desireable communication network. The number and prestige level of the opinion leaders is   phenomenol. That these facts alone do not result in automatic innovativeness is apparent from an inspection of the school's showing on the measures of innovativeness. Although ranked second on change orientation, School 2 was fourth on innovation internalization. It may be that time is interacting with the other factors to suppress the internalization score (it will be recalled that School 5 was the latest knower and the latest adopter among the six schools). Without an extension of the analysis, it can only be speculation.

School 6 also seems to have some potential warning signs. It suffers from a large number of isolates (teachers 6, 8, and 15) for its size. Six of its teachers have only single advice links. The absence of teacher 16 would isolate teacher 22 as well as the three-member clique. Lastly the fact that teacher 18 is the only opinion leader must be viewed as a weakness. Despite the fact that this person(18) is the principal, he is still the only opinion leader designated. His prestige is not significantly high either. And although School 6 heard about and adopted team teaching rather early, the teachers have not internalized its use to any great extent. An examination of why this last is

true, coupled with a systematic plan to develop other opinion leaders among the teachers would seem a fruitful venture. One person cannot make the world go round, at least not for long. Efforts to involve the staff in a sharing of their concerns about team teaching and a working through of these concerns seems indicated.

A generalization that seems appropriate to all the schools is that the role of the principal in the elementary school needs to be carefully examined. Based on these findings, those situations which exhibit a high congruence between the leaders of the formal organization , as denoted by their job titles, and the leaders of the informal organizations, as designated by the organization's members, seem most likely to be encouraging to innovation. Witness School 4. We need to look more closely at the factors which lead to this desireable condition and incorporate them in programs directed at preparing elementary principals to be more effective leaders and managers of change. Elementary schools seem to present a situation where the notion of a principal whose primary concern is administration is contrary to conditions which foster innovation. Programs to address these needs are obviously needed. What they should include is only somewhat known. Some steps have been noted above. Recommendations for future research which might provide additional information for action are included in the next section.

Recommendations for Future Research

Research designed to extend the findings of the present study should attempt to answer several related questions which have arisen from the analysis of the current data. One group of questions deals with innovation internalization. What is the interaction between time and innovation internalization? Do characteristics of the innovation affect its internalization one way or the other? What methods of innovation introduction and demonstration are most effective in speeding its internalization?

Questions regarding change orientation are also present. Is the measure employed in fact reliable over time and unaffected by the particular innovation under consideration? What is the relationship of change orientation to other psychological characteristics of the respondents? Of what use might such information regarding their change orientation be in selecting teachers? What is the relationship of change orientation to success as a teacher in school X?

Regarding innovativeness in general. What is the relationship between innovativeness of a teaching staff and the environment of the school as seen by the students? A hint that the two are related is provided by the McKay findings cited in the previous section. Future research might uncover previously unanticipated relationships between the informal

organization of a school and its effect on the children's view of the learning environment around them. What is the relationship between innovativeness and student achievement? Perhaps innovativeness isn't really important in helping students to learn.

Regarding the communications network. What is the effect of one of the strategies suggested earlier on the communication network and on the innovativeness of the staff of a given school? Is there an ideal mix of structural characteristics that facilitates innovation? The findings here suggest that a cohesive group is not the panacea by itself, but it must have some additional features in order to be most effective as a vehicle for innovation. Are these same factors important for organizational structures other than elementary schools?

The role of the principal is apparently a central one in the elementary schools studied. Is this true in other settings as well? Perhaps we need to differentiate between elementary schools and high schools in our inservice training programs for principals, for example. What factors result in the assistant principal being the prime opinion leader in certain schools? Is there a dominant leadership style in these schools that accounts for the central position of principals and others? Most current training programs

for school administrators put little emphasis on the skills required to become a respected source of advice. What are the characteristics of an innovative principal? What are the effects on children of an innovative or non innovative principal? Are there different effects in elementary schools, as studied here, and high schools? Perhaps what is most needed is additional specification about what kinds of activities such an opinion leader engages in, what his methods of communication are, how he relates to his peers, etc. It may be that a new role needs to be defined. Once defined, how could we best train these "internal" change agents to function in these new roles? What would be the structure of the organization after the entry of such an agent? The questions are myriad, the possibilities exciting.

The answers to these questions could provide even more positive direction for institutions and individuals interested in improving education. When we have a surer grasp on the critical variables that affect the innovativeness of our schools, we will be much closer to finding vehicles to meet the pressing needs of our children. Elements of educational organizations that can be effectively manipulated to meet these needs must be sought out and utilized. This study has hopefully been one small step in that direction.

BIBLIOGRAPHY

Allen, Dwight W., "A Differentiated Staff: Putting Teacher
    Talent to Work", The Teacher and his Staff - Occasional
    Paper No. 1. Washington, D. C.: National Commission on
    Teacher Education and Professional Standards, NEA, 1967.

Anderson, Robert H., "The Organization and Administration of
    Team Teaching", in Shaplin, Judson T. and Olds, Henry F.,
    Jr. (eds.), Team Teaching. New York: Harper and Row,
    1964.

Bavelas, A., "Communication Patterns in Task Oriented Groups",
    in Cartwright, Dorwin and Zander A. (eds.), Group Dynamics.
    Evanston, Illinois: Row Peterson, 1960.

Beggs, David W., III (ed.), Team Teaching - Bold New Venture.
    Indianapolis: Unified College Press, Inc., 1964.

Benne, Kenneth D. and Muntyan, Bozidar, Human Relations in
    Curriculum Change. New York: Dryden Press, 1951.

Bennis, Warren G., "A Typology of Change Processes", in
    Bennis, Benne, and Chin, The Planning of Change. New
    York: Holt, Rinehart and Winston, 1961.

Bennis, Warren G., Benne, Kenneth D. and Chin, Robert, The
    Planning of Change. New York: Holt, Rinehart and Winston,
    1961.

Bennis, Warren G., Benne, Kenneth D. and Chin, Robert, The
    Planning of Change. New York: Holt, Rinehart and Winston,
    1969, second edition.

Berge, C., The Theory of Graphs and Its Application. New
    York: John Wiley, 1962.

Brickell, Henry M., "State Organization for Educational
    Change: A Case Study and A Proposal", in Miles, Matthew
    B., Innovations in Education. New York: Teachers College,
    1964.

Brickell, Henry M., "Two Change Strategies for Local School
    Systems", in Rational Planning in Curriculum and Instruc-
    tion. Washington: NEA, 1967.

Carlson, Richard O., "School Superintendents and the Adoption of Modern Math: A Social Structure Profile", in Miles, Matthew B., Innovations in Education. New York: Teachers College, 1964.

Carlson, Richard O., Adoption of Educational Innovations. Eugene: University of Oregon Press, 1965.

Cartwright, Dorwin, "Lewinian Theory as a Contemporary Systematic Framework", undated chapter reprint.

Chamberlin, Leslie J., Team Teaching - Organization and Administration. Columbus, Ohio: Charles E. Merrill Publishing Company, 1969.

Chesler, Mark Arnold, Social Structure and Innovation in Elementary Schools. Unpublished Ph.D. Dissertation, University of Michigan, 1966.

Chin, Robert, "The Utility of System Models and Developmental Models for Practitioners", in Bennis, W. G. et al, The Planning of Change. New York: Holt, Rinehart and Winston, 1961.

Chin, Robert, and Benne, Kenneth D., "General Strategies for Effecting Changes in Human Systems", in Bennis, W. G. et al, The Planning of Change. Second Edition. New York: Holt, Rinehart and Winston, 1969.

Christiansen, J. A. and Taylor, R. C., "The Adoption of Educational Innovations among Teachers of Vocational Agriculture", Ohio State, 1966. (see ED 016 783)

Clark, David L., "Educational Research and Development: The Next Decade", in Morphet, Edgar L. (ed.), Implications for Education of Prospective Changes in Society, Designing Education for the Future, No. 2. New York: Citation Press, 1967.

Clark, David L. and Guba, Egon G., "An Examination of Potential Change Roles in Education", in Rational Planning in Curriculum and Instruction. Washington: NEA, 1967.

Coch, Lester, and French, John R. P., Jr., "Overcoming Resistance to Change", in Maccoby, Eleanor E. et al, Readings in Social Psychology, third edition. New York: Holt and Company, 1958.

Coleman, James S., Introduction to Mathematical Sociology. New York: The Free Press of Glencoe, 1964.

Coleman, James S., Katz, Elihu, and Menzel, Herbert, Medical Innovation - A Diffusion Study. Indianapolis: The Bobbs-Merrill Company, Inc., 1966.

Coleman, James, Menzel, Herbert, and Katz, Elihu, "Social Processes in Physicians' Adoption of a New Drug", in Etzioni, A. and E., Social Change. New York: Basic Books, 1964.

Dean, Stuart E., "Team Teaching: A Review", School Life, Vol. 44, September 1961, pp. 5-8.

Dionne, Joseph L., "Principles and Practices of Organizing School Districts for Innovation", in Lawler, Marcella R., Strategies for Planned Curricular Innovation. New York: Teachers College, 1970.

Eichholz, Gerhard and Rogers, Everett M., "Resistance to the adoption of audio-visual aids by elementary school teachers: contrasts and similarities to agricultural innovation", in Miles, M. B., Innovations in Education. New York: Teachers College, 1964.

Flament, C., Applications of Graph Theory to Group Structure. Englewood Cliffs, New Jersey: Prentice-Hall, 1963.

Goodlad, John I., "Thought Invention and Research in the Advancement of Education", in The Schools and the Challenge of Innovation. Committee for Economic Development Supplementary Paper, H. Thomas James et al. New York: McGraw-Hill Book Company, 1969.

Goodlad, John I. and Anderson, Robert H., The Nongraded Elementary School. New York: Harcourt, Brace and World, Inc., 1963.

Goodlad, John I. and Richter, Maurice N., Jr., The Development of a Conceptual System for Dealing with Problems of Curriculum and Instruction. Los Angeles: IDEA, June 1966.

Guba, Egon G. and Clark, David L., "An Examination of Potential Change Roles in Education", in Rational Planning in Curriculum and Instruction. Washington: NEA, 1967.

Guba, Egon G., A Model of Change for Instructional Development. Bloomington, Indiana: NISEC, June 25, 1968.

Guba, Egon G., "Development, Diffusion and Evaluation", in Knowledge Production and Utilization in Educational Administration. Eugene: University of Oregon Press, 1968.

Havelock, Ronald G., "Dissemination and Translation Roles," in Knowledge Production and Utilization in Educational Administration. Eugene: University of Oregon Press, 1968.

Havelock, Ronald G., Planning for Innovation through Dissemination and Utilization of Knowledge. Ann Arbor, Michigan: CRUSK, ISR, University of Michigan, July 1969.

Havelock, Ronald G., A Guide to Innovation in Education. Ann Arbor, Michigan: CRUSK, ISR, University of Michigan, 1970.

Jenkins, David H., "Force Field Analysis Applied to a School Situation", in Bennis et al, The Planning of Change, New York: Holt, Rinehart and Winston, 1961.

Jennings, Helen Hall. Sociometry in Group Relations. Washington, D. C.: American Council on Education, 1959.

Katz, Elihu, "The Social Itinerary of Technical Change: Two Studies on the Diffusion of Innovation", in Human Organization, Volume XVIII, No. 2, 1961.

Katz, Elihu, "The Two-step Flow of Communication: An Up-to-date Report on a Hypothesis", in Proshansky, Harold and Seidenberg, Bernard (eds.), Basic Studies in Social Psychology. New York: Holt, Rinehart and Winston, 1965.

Katz, Elihu and Lazarsfeld, Paul F., Personal Influence. New York: The Free Press of Glencoe, 1955.

Levinger, George, "Kurt Lewin's Approach to Conflict and Its Resolution", in Bennis et al, The Planning of Change. New York: Holt, Rinehart and Winston, 1961.

Lewin, Kurt, "Group Decision and Social Change", in Maccoby, Eleanor E., Newcomb, Theodore M., and Hartley, Eugene L., Readings in Social Psychology. Third Edition. New York: Henry Holt and Company, 1958.

Lewin, Kurt, "Quasi-Stationary Social Equilibria and the Problem of Permanent Change", in Bennis et al, The Planning of Change. New York: Holt, Rinehart and Winston, 1961.

Lin, Nan, _Innovation Internalization in a Formal Organization_. Unpublished Ph.D. Dissertation, Department of Communication, Michigan State University, 1966(a).

Lin, Nan, "Innovative Methods for Studying Innovation in Education and An Illustrative Analysis of Structural Effects on Innovation Diffusion within Schools", paper delivered at the National Conference on the Diffusion of Educational Ideas, Michigan State University, March 26-28, 1968. (ED 017 741)

Lin, Nan, Leu, Donald J., Rogers, Everett M., and Schwartz, Donald H., _The Diffusion of an Innovation in Three Michigan High Schools: Institution Building Through Change_. Institute for International Studies in Education and Department of Communication, Michigan State University, December 1966(b).

Lindzey, Gardner and Borgatta, Edgar F., "Sociometric Measurement", in Lindzey, Gardner (ed.), _Handbook of Social Psychology, Volume I_. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1954.

Lionberger, Herbert F., _Adoption of New Ideas and Practices_. Ames, Iowa: The Iowa State University Press, 1960.

Lionberger, Herbert F., "Diffusion of Innovations in Agricultural Research and in Schools", in Leeper, Robert R. (ed.), _Strategy for Curriculum Change_. Washington, D.C.: ASCD, 1965.

Lionberger, Herbert F., "Strategy Implications for Planned Curricular Changes in Education: Inferences from Diffusion Research", in Lawler, Marcella R. (ed.), _Strategies for Planned Curricular Innovation_. New York: Teachers College Press, 1970.

Lippitt, Ronald, "Dimensions of the Consultant's Job", in Bennis et al, _The Planning of Change_. New York: Holt, Rinehart and Winston, 1961.

Lippitt, Ronald, "Processes of Curriculum Change", in Leeper, Robert R. (ed.), _Curriculum Change: Direction and Process_. Washington, D.C.: ASCD, 1966.

Lippitt, Ronald, "Roles and Processes in Curriculum Development and Change", in Leeper, Robert R. (ed.), _Strategies for Curriculum Change_. Washington, D.C.: ASCD, 1965.

Lippitt, Ronald, Watson, Jeanne, and Westley, Bruce, The Dynamics of Planned Change. New York: Harcourt, Brace and World, Inc., 1958.

Loomis, Charles P., "Tentative Types of Directed Social Change Involving Systemic Linkage", in Bennis et al, The Planning of Change. New York: Holt, Rinehart and Winston, 1961.

McClelland, William A., "The Process of Effecting Change", The George Washington University Human Resources Research Office, Professional Paper 32-68, October 1968. (ED 025 038)

McKay, A. Bruce, Principals, Teachers and Elementary Youth: Measurement of Selected Variables of Teacher-Principal Social Interaction and Educational Environment. Unpublished Ed.D. Dissertation, University of Massachusetts, 1971.

McNemar, Quinn, Psychological Statistics. New York: John Wiley, 1963.

Menzel, Herbert, and Katz, Elihu, "Social Relations and Innovation in the Medical Profession: The Epidemiology of a New Drug", in Maccoby et al, Readings in Social Psychology. Third Edition. New York: Henry Holt and Company, 1958.

Miles, Matthew B. (ed.), Innovation in Education. New York: Teachers College Press, 1964.

Miles, Matthew B., "Educational innovation: the nature of the problem", in Miles, Innovation in Education. New York: Teachers College Press, 1964.

Miles, Matthew B., "On temporary systems", in Miles Innovation in Education. New York: Teachers College Press, 1964.

Miles, Matthew B., "Innovation in education: some generalizations", in Miles, Innovation in Education. New York: Teachers College Press, 1964.

Miles, Matthew B., "Planned Change and Organizational Health: Figure and Ground", in Carlson, Richard O. et al, Change Processes in the Public Schools. Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1965.

Mort, Paul R., "Studies in educational innovation from the Institute of Administrative Research: an overview", in Miles, Innovation in Education. New York: Teachers College Press, 1964.

Northway, Mary L. and Weld, Lindsay, Sociometric Testing - A Guide for Teachers. Toronto, Canada: University of Toronto Press, 1960.

Parsons, Talcott, "A Functional Theory of Change", in Etzioni, Amitai and Eva (eds.), Social Change. New York: Basic Books, Inc., 1964.

Parsons, Talcott, "The Problem of the Theory of Change", in Bennis et al, The Planning of Change. New York: Holt, Rinehart and Winston, 1961.

Pelz, Edith Bennett, "Some Factors in 'Group Decision'", in Maccoby et al, Readings in Social Psychology. Third Edition. New York: Henry Holt and Company, 1958.

Rogers, Everett M., Diffusion of Innovations. New York: The Free Press, 1962.

Rogers, Everett M. and Svenning, Lynne, Managing Change. Operation PEP, San Mateo County School Board, California, September 1969.

Rogers, Everett M., and Jain, Hemi C., "Needed Research on Diffusion within Educational Organizations", paper presented at the National Conference on the Diffusion of Educational Ideas, East Lansing, Michigan, March 26-28, 1968.

Ross, H. and Harary, F., "On the Determination of Redundancies in Sociometric Chains". Psychometrika, 1952, 17, 195-208.

Rubin, Louis J., "The Mythology of Innovation", in California Journal for Instructional Improvement, October 1969.

Schein, Edgar H., "The Mechanisms of Change", in Bennis et al, The Planning of Change. Second Edition. New York: Holt, Rinehart and Winston, Inc., 1969.

Shaplin, Judson T. and Olds, Henry F., Sr. (eds.), Team Teaching. New York: Harper and Row, 1964.

Sherif, Muzafer, "Group Influences upon the Formation of Norms and Attitudes", in Maccoby et al, Readings in Social Psychology. Third Edition. New York: Henry Holt and Company, 1958.

Watson, Goodwin, "Resistance to Change", in Bennis et al, The Planning of Change. Second Edition. New York: Holt, Rinehart and Winston, Inc., 1969.

Watson, Goodwin, "Utopia and rebellion: the New College experiment", in Miles, Innovation in Education. New York: Teachers College Press, 1964.

Watson, Goodwin and Glaser, Edward M., "What We Have Learned About Planning for Change", xerox paper, source unknown.

Wiles, Kimball, "Contrasts in Strategies of Change", in Leeper, Robert R. (ed.), Strategy for Curriculum Change. Washington, D. C.: ASCD, 1965.

Wolf, W. C., Jr., and Fiorino, A. John, A Study of Educational Knowledge Diffusion and Utilization. Xerox paper, undated.

York, Jean, Team Teaching - A Series of Seven Instructional Units. Dallas, Texas: The Leslie Press, 1971.

APPENDIX A

Variable List for the Questionnaire

Appendix A

VARIABLE LIST FOR THE QUESTIONNAIRE

Variables	Questionnaire item number(s)
Dependent Variables	
I. Time of awareness	83
II. Time of adoption	84
III. Innovation internalization	81, 82, 88, 89
IV. Self-perceived change orientation	93 - 96
Independent Variables	
I. Demographic characteristics	
1. Position	107
2. Sex	108
3. Age	109
4. Teaching years (in total)	110
5. Teaching years (in given school)	111
6. Teaching income	112
7. Non-teaching income	113
8. Education	114
II. Attributes of the innovation	
1. Number of disadvantages	90
2. Number of advantages	91
3. Perceived student benefits from the innovation	86
4. Perceived student attitude toward the innovation	87
5. Perceived student receptivity to the innovation (composite score; 3 and 4 above)	86, 87

Appendix A (cont.)

	Variables	Questionnaire item number(s)
III.	Group norms	
	1. Attitude toward innovators	97
	2. Perceived decision-making power	106
IV.	Information level	
	1. Extent of awareness of new practices	98, 99
	2. Extent and direction of communication	83, sociometric item
V.	Group structure	
	1. Number of opinion leaders	sociometric item
	2. Number of isolates	sociometric item
	3. Number of minor cliques	sociometric item
	4. Number of primary liasons	sociometric item
	5. Number of secondary liasons	sociometric item

APPENDIX B

The Questionnaire

Network of Innovative Schools

Opinion Survey of Elementary Educators

This questionnaire is part of a study being conducted by the Network to investigate the opinions of elementary educators on crucial educational issues related to team teaching. The emphasis of the study is on communication behavior and diffusion processes within schools.

We are interested in the types and groups of opinions that elementary educators in general may have rather than characteristics of any one individual. This study will not identify any individuals or schools by name. Your answers will be read and studied by the Network research team only and will be kept in the strictest confidence.

Please help this important study by carefully and honestly completing each item. Significant and meaningful results can be achieved only if you do not skip any items.

Thank you for your cooperation.

David P. Crandall, Director
A. Bruce McKay, Research Coordinator
Jon Scott Bender, Research Associate

University of Massachusetts
January 1971

DIRECTIONS:

These questions are to be answered in section III of your second
answer sheet - spaces 81 - 114. For each item, mark the response
which you feel is appropriate, as in the following example.

Example:

Children in this country are very energetic compared
with those in other countries.

1. agree very much
2. agree somewhat
3. don't know
4. disagree somewhat
5. disagree very much

1 2 3 4 5

[] [] [] ▦ []

In this example, the person marked space number 4, to indicate that he
disagreed somewhat with the statement.

Some of the items request you to write in your answer on the
questionnaire form itself. Blank spaces are provided for this purpose.

If you have any questions, now or as you go along, please raise your
hand and one of us will be happy to speak with you.

For purposes of this study, team teaching is defined as an arrangement
whereby two or more teachers, with or without teacher aides, cooperatively
plan, instruct and evaluate one or more class groups. This activity
takes place in an appropriate instructional space and given length of time,
so as to take advantage of the special competencies of the team members.

REMINDER: START WITH NUMBER 81 ON YOUR SECOND ANSWER SHEET.

81. Team teaching could constitute an improvement in educational practices
     in any school.

     1. agree very much
     2. agree somewhat
     3. don't know
     4. disagree somewhat
     5. disagree very much

82. I think team teaching represents an improvement in educational practices
     at my school.

     1. agree very much
     2. agree somewhat
     3. don't know
     4. disagree somewhat
     5. disagree very much

83. Had you heard about team teaching before today?

    1. No   2. Yes

    When did you first hear about team teaching? (as best you can recall)

    (month) _____ (year) _____

84. Have you used team teaching yourself in <u>this</u> <u>school</u>?

    1. No   2. Yes

    When did you first use it? (as best you can recall)

    (month) _____ (year) _____

85. I have since:

    1. increasingly used it
    2. maintained using it
    3. decreased using it
    4. quit using it in _____(month) _____ (year)

86. My personal view regarding the use of team teaching is that the students...

    1. benefit greatly
    2. benefit somewhat
    3. not sure
    4. do not benefit much
    5. do not benefit at all

87. Since we began using team teaching, my students' attitude toward it has been, on the whole,

    1. extremely enthusiastic
    2. quite enthusiastic
    3. so, so
    4. not very enthusiastic
    5. not at all enthusiastic

88. I think team teaching is unnecessary in our educational system.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

89. To me, team teaching is one of the worst things to come into our educational system.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

    What are the disadvantages that you thought team teaching would bring into the schools?

    _____

    _____

    _____

90. How many disadvantages have you listed above?

    1. one
    2. two
    3. three
    4. four
    5. five or more

    What are the advantages that you thought team teaching would bring into the school?

    _____

    _____

    _____

91. How many advantages have you listed above?

    1. one
    2. two
    3. three
    4. four
    5. five or more

92. After weighing these possible problems, what was your personal conclusion?

    1. team teaching should be continued
    2. team teaching should be discontinued

93. Personally, I feel I can adjust to changes easily.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

94. If we want to maintain a healthy and stable educational system, we must keep it the way it is and resist the temptations to change.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

95. Most changes introduced in the last ten years have contributed very little to improved education in our schools.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

96. I really believe we could have done a much better job or at least done just as well if things hadn't changed so much in our schools.

    1. agree very much
    2. agree somewhat
    3. don't know
    4. disagree somewhat
    5. disagree very much

97. In your opinion, what do people in your school think of the individuals
    who are the first to adopt new educational practices?

    1. viewed very favorably
    2. viewed somewhat favorably
    3. don't care one way or the other
    4. viewed somewhat unfavorably
    5. viewed very unfavorably

    Please indicate by name (for example, John Jones) up to three colleagues
    in your school whose advice you most frequently seek on problems
    related to educational practice.

    _____   or   _____ I generally don't seek
                                                    advice
    _____   _____ I generally seek advice,
                                                    not from my colleagues
    _____   here, but from

                                            _____

98. Which of the following topics have you heard about and/or discussed
    with other people in your school during the last six months? (mark
    as many as appropriate)

    1. use of TV in classrooms
    2. programmed learning
    3. instructional materials center
    4. non-graded school
    5. integrated day/Leicestershire model

99. Same as #98 above.

    1. ESS Science
    2. schedule modifications
    3. language laboratory
    4. differentiated staffing
    5. humanistic education (for example, magic circles)

100. During the past six months, have you told anyone in your school
     about any new educational practices?

     1. No   2. Yes

101. Compared with your circle of friends in the school, are you usually
     more or less likely to be asked for opinions about educational
     practices?

     1. more
     2. less

102. Thinking back to the last time you discussed a new educational practice,
     were you asked for your opinion or did you ask someone else for theirs?

     1. I was asked
     2. I asked someone else
     3. both

103. When you and your colleagues discuss new ideas about education, what part do you usually play? mainly listen <u>or</u> try to convince them of your ideas?

1. mainly listen
2. try to convince
3. some of each

104. Which of these happens more often? you tell your colleagues about some new educational practice, <u>or</u> they tell you?

1. I tell them
2. They tell me
3. about fifty-fifty

105. Do you have the feeling that you are generally regarded by your colleagues as a good source of advice about new educational practices?

1. No   2. Yes

106. Regarding the decision to adopt team teaching in your school, do you feel it was:

1. your personal decision
2. a decision upon which you had no influence but you had the choice of adopting it or not
3. a decision by consensus but you had the option of adopting it or not
4. a decision by consensus but you were required to adopt it
5. a decision made for you and you were required to adopt it

<u>or</u> other (please specify) _____

_____

107. What is your position in the school?

1. full-time teacher
2. part-time teacher
3. special teacher (for example, reading, music, art)
4. teacher aide
5. support staff (for example, counselor, secretary, librarian)

<u>or</u> other (please specify) _____

Name _____

108. What is your sex?

1. female   2. male

109. What is your age?

1. 20-29
2. 30-39
3. 40-49
4. 50-59
5. 60 or over

110. How many years have you been teaching in total?

1. less than 3
2. 3-5
3. 6-10
4. 11-15
5. 16 or more

111.   How many years have you been teaching at this school?

1.   less than 1
2.   1-2
3.   3-5
4.   6-10
5.   11 or more

112.   What is your current salary level?

1. $6800-7800
2.   7900-9100
3.   9200-10400
4.   10500-11700
5.   11800 or more

113.   How much over and above your teaching salary did you earn from other sources last year?

1.   none
2.   less than $500
3. $500-1500
4. $1600-2500
5. $2600 or more

114.   Educational background:

1.   1-3 years college
2.   Bachelor's degree
3.   Master's degree
4.   Master's degree + _____ credits
5.   C.A.G.S. or doctorate

   We would appreciate any comments that you may have concerning the items in this questionnaire. Feel free to use the bottom of this sheet if you would like. Thank you again for your cooperation and patience.

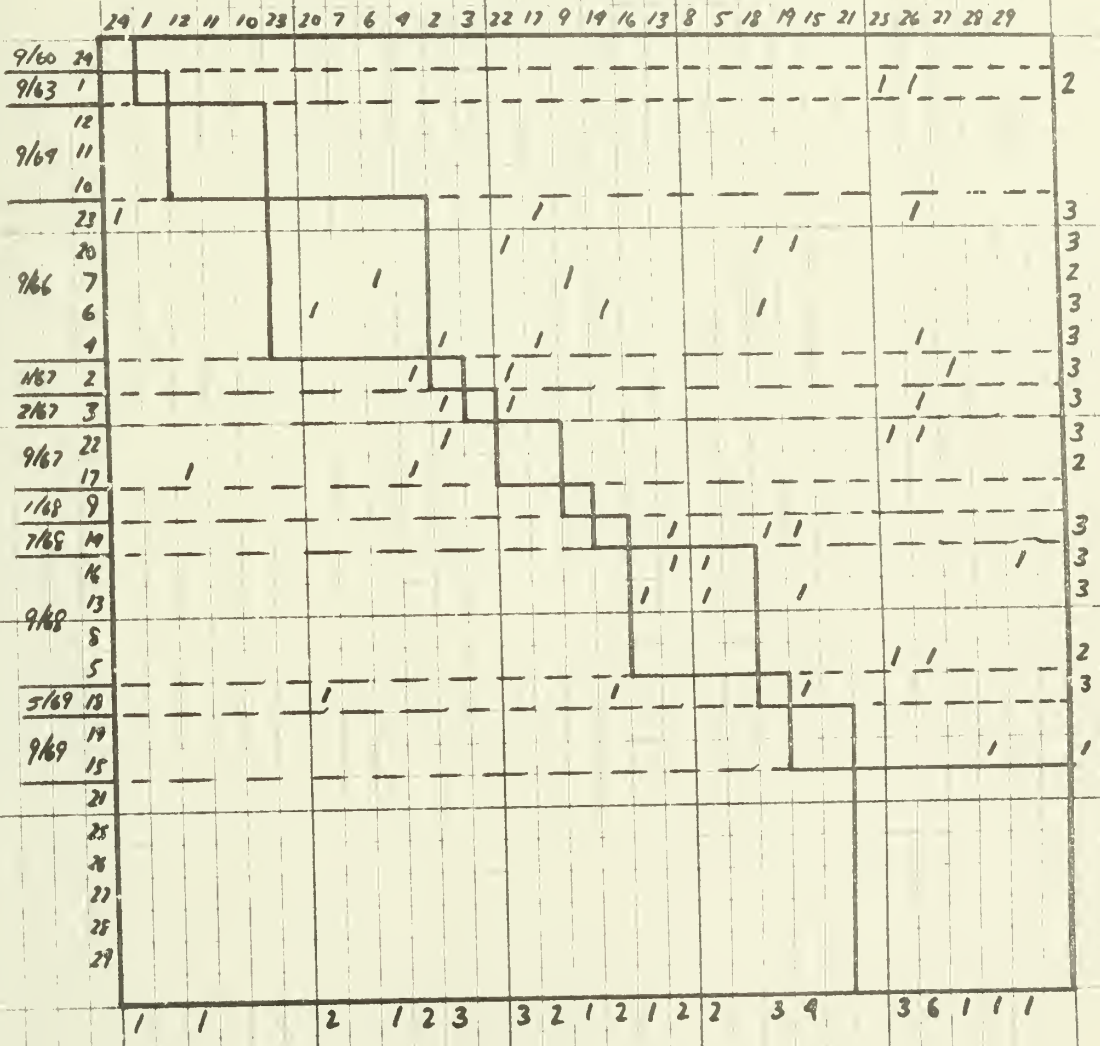
APPENDIX C

The Communications Matrices for Teachers in the
Schools Partitioned by Month and Year of Innovation Awareness

Appendix C-1: Communication Matrix for Teachers in
School 1 Partitioned by Month and Year
of Innovation Awareness

Appendix C-2: Communication Matrix for Teachers in
School 3 Partitioned by Month and Year
of Innovation Awareness

Appendix C-3: Communication Matrix for Teachers in
School 4 Partitioned by Month and Year
of Innovation Awareness

Appendix C-4: Communication Matrix for Teachers in
School 5 Partitioned by Month and Year
of Innovation Awareness

Appendix C-5: Communication Matrix for Teachers in
School 6 Partitioned by Month and Year
of Innovation Awareness

APPENDIX D

The Distance Matrices for Teachers in the Schools

Appendix D-1: Distance Matrix for Teachers in School 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1		3	1	2	2		2	3	3	5	1	1	2	3	1	5	2	3	2	4	2	4	1	3	3	3	4	2	4
2	3		2	1	3		3	4	2	4	4	2	5	6	1	5	1	5	3	5	4	3	2	2	4	2	4	5	6
3	1	2		1	1		3	3	2	4	2	1	3	4	2	4	2	4	2	3	3	3	2	2	2	3	3	3	5
4	2	1	1		2		2	4	1	5	3	2	4	5	3	5	2	4	3	4	3	4	1	1	3	3	4	4	5
5	2	3	1	2			4	4	1	3	3	2	4	4	3	3	3	3	3	2	4	2	3	3	1	3	2	4	4
6																													
7	2	3	3	2	4			5	3	6	1	3	2	3	3	6	4	2	1	3	1	5	1	3	4	5	5	4	3
8	3	4	3	4	4		5		5	6	4	2	5	6	2	7	3	6	1	6	8	5	4	5	5	4	6	3	7
9	3	2	2	1	1		3	5		4	4	3	5	5	4	4	3	4	4	3	4	3	2	2	2	4	3	5	5
10	5	4	4	5	3		6	6	4		6	4	5	5	6	2	3	1	5	3	5	1	6	6	2	2	1	7	5
11	1	4	2	3	3		1	4	4	6		2	1	2	2	6	3	2	3	3	1	5	2	4	4	4	5	3	3
12	1	2	1	2	2		3	2	3	4	2		3	4	2	5	1	4	1	4	3	3	2	3	3	2	4	3	5
13	2	5	3	4	4		2	5	5	5	1	3		1	3	5	4	1	4	2	2	4	3	5	3	5	4	4	2
14	3	6	4	5	4		3	6	5	5	2	4	1		1	5	5	1	5	2	2	4	1	6	3	5	4	5	2
15	1	4	2	3	3		3	2	4	6	2	2	3	4		6	3	4	1	5	3	5	2	4	4	4	5	1	5
16	5	5	4	5	3		6	7	4	2	6	5	5	5	6		4	1	6	3	5	2	6	6	2	3	1	7	5
17	2	1	2	2	3		4	3	3	3	3	1	4	5	3	4		5	2	4	4	2	3	3	3	1	3	4	6
18	3	5	4	4	3		2	6	4	4	2	4	1	1	4	4	5		5	1	1	3	3	5	2	4	3	5	1
19	2	3	2	3	3		4	1	4	5	3	1	4	5	1	6	2	5		5	4	4	3	4	4	3	5	2	6
20	4	5	3	4	2		3	6	3	3	3	4	4	2	2	5	3	4	1		5	2	2	4	5	1	3	2	6
21	2	4	3	3	4		1	5	4	5	1	3	2	2	3	5	4	1	4	2		4	2	4	3	5	4	4	2
22	4	3	3	4	2		5	5	3	1	5	3	4	4	5	2	2	3	4	2	4		5	5	1	1	1	6	4
23	1	2	2	1	3		1	4	2	6	2	2	3	4	2	6	3	3	3	4	2	5		2	4	4	5	3	4
24	3	2	2	1	3		3	5	2	6	4	3	5	6	4	6	3	5	4	5	4	5	2		4	4	5	5	6
25	3	4	2	3	1		4	5	2	2	4	3	3	3	4	2	3	2	4	1	3	1	4	4		2	1	5	3
26	3	2	3	3	3		5	4	4	2	4	2	5	5	4	3	1	4	3	3	5	1	4	4	2		2	5	5
27	4	4	3	4	2		5	6	3	1	5	4	4	4	5	1	3	3	5	2	4	1	5	5	1	2		6	4
28	2	5	3	4	4		4	3	5	7	3	3	4	5	1	7	4	5	2	6	4	6	3	5	5	5	6		6
29	4	6	5	5	4		3	7	5	5	3	5	2	2	5	5	6	1	6	2	2	4	4	6	3	5	4	6	

Appendix D-2: Distance Matrix for Teachers in
School 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1		3	2	2	2	4	5	6	6			4	5	8		6	3	4	9	3		2	2	3	1	1	4		7
2	3		1	1	3	3	9	5	5			3	9	4		5	2	3	3	2		1	3	4	2	2	1		6
3	2	1		2	2	3	9	5	5			4	9	4		5	3	3	3	2		1	2	3	2	1	2		6
4	2	1	2		2	9	5	6	6			2	5	5		6	1	4	9	3		2	2	3	3	1	2		7
5	2	3	2	2		9	5	6	6			9	5	5		6	3	9	9	3		2	2	3	1	1	9		7
6	4	3	3	4	9		1	3	2			6	2	1		3	5	1	2	1		2	9	5	3	3	9		9
7	5	9	9	5	5	1		9	1			7	3	2		4	6	2	3	2		3	5	6	9	9	5		5
8	6	5	5	6	6	3	4		5			8	1	2		1	7	3	2	3		9	6	7	5	5	6		2
9	6	5	5	6	6	2	1	8				8	9	3		5	7	3	9	3		9	6	7	5	5	6		6
10																													
11																													
12	9	3	9	2	9	6	7	8	8				7	7		8	1	6	6	5		9	2	3	5	3	9		9
13	5	9	9	5	5	2	3	1	9			7		1		1	6	2	1	2		3	5	6	9	9	5		2
14	5	9	9	5	5	1	2	2	3			7	1			2	6	1	1	2		3	5	6	9	9	5		3
15																													
16	6	5	5	6	6	3	9	1	5			8	1	2			7	3	2	3		9	6	7	5	5	6		1
17	3	2	3	1	3	5	6	7	7			1	6	6		7		5	5	9		3	1	2	9	2	3		8
18	9	3	3	9	9	1	2	3	3			6	2	1		3	5		1	1		2	9	5	3	3	4		9
19	9	3	3	9	9	2	3	2	9			6	1	1		2	5	1		1		2	9	5	3	3	9		3
20	3	2	2	3	3	1	2	3	3			5	2	2		3	9	1	1			1	3	9	2	2	3		9
21																													
22	2	1	1	2	2	2	3	9	9			9	3	3		9	3	2	2	1			2	3	1	1	2		5
23	2	3	2	2	2	9	5	6	6			2	5	5		6	1	9	9	3		2		1	3	1	9		7
24	3	9	3	3	3	5	6	7	7			3	6	6		7	2	5	5	9		3	1		9	2	5		8
25	1	2	2	3	1	3	9	5	5			5	9	9		5	9	5	3	2		1	3	9		2	3		6
26	1	2	1	1	1	3	9	5	5			3	9	9		5	2	3	3	2		1	1	2	2		3		6
27	4	1	2	2	9	9	5	6	6			9	5	5		6	3	9	9	3		2	9	5	3	3			7
28																													
29	7	6	6	7	7	9	5	2	6			9	2	3		1	8	9	3	9		5	7	8	6	6	7		

Appendix D-3: Distance Matrix for Teachers in School 4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2		2	3	3	2	2	2	1	2	2	1		3	2	3	3	3
2	2		2	2	2	2	2	2	2	2	2	1	2	2	2	1	2	2	3	2	2	2		2	3	8	2	2	2	1	2	2	1		2	2	3	3	3
3	2	2		2	3	2	1	2	2	2	2	2	1	2	3	2	2	2	4	2	2	2		2	3	3	2	3	1	2	2	2			3	2	4	3	3
4	2	2	2		1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	3	3	2	2	2	1	2	2	1		3	2	3	3	3
5	2	2	3	1		2	3	2	3	3	3	2	2	3	2	2	2	2	2	1	2	3		2	9	3	2	2	2	2	2	3	1		3	3	3	4	9
6	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	1	1	2	2	1	2	2	1		3	2	3	3	3
7	2	2	1	2	3	2		2	2	2	2	2	1	2	3	2	2	2	4	2	2	2		2	3	3	3	2	3	1	2	2	2		3	2	4	3	3
8	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	3	2	1	2		2	3	3	2	2	1	2	2	1			3	2	3	2	2
9	2	2	2	2	3	2	2	2		1	2	2	5	2	3	2	2	2	4	2	2	2		2	3	3	3	2	2	1	2	2	3		1	2	3	3	3
10	2	2	2	2	3	2	2	2	1		2	2	3	2	3	2	2	2	4	2	2	2		1	3	3	3	2	3	1	2	2	2		2	2	4	3	3
11	2	2	2	2	3	2	2	2	2	2		2	3	2	3	2	2	2	4	2	2	2		1	3	3	3	2	2	1	2	2	2		1	2	3	3	3
12	2	1	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	3	2	2	2		2	3	3	2	2	1	2	2	1			3	2	5	3	3
13	2	2	1	2	2	1	2	3	3	3	2		3	2	2	2	3	2	3	2		2		9	3	2	2	2	2	3	1			3	3	3	4	9	
14	2	2	2	2	3	2	2	2	2	2	2	2	3		2	1	2	2	3	2	2	2		2	3	3	3	2	3	1	2	2	2		2	2	4	3	3
15	2	2	3	2	2	3	2	3	3	3	2	2	2		1	2	2	1	2	3	2			2	4	3	2	2	2	2	3	1			2	3	3	4	9
16	2	1	2	2	2	2	2	2	2	2	2	2	1	1		2	2	2	2	2		2		2	3	3	2	2	1	2	2	1			1	2	5	3	3
17	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		1	3	2	2	2			2	3	3	2	2	1	2	2	1			3	2	5	3	3
18	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1		3	1	2	2		2	3	3	2	2	1	2	2	1			3	2	3	3	3
19	3	3	4	2	1	2	4	3	4	4	4	3	3	1	2	3	3		2	3	3			3	4	3	1	3	3	3	3	1	2		3	4	4	5	5
20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	3		2	2			2	3	3	2	2	1	2	2	1			3	2	3	3	3
21	2	2	2	2	3	2	2	1	2	2	2	2	5	2	5	2	2	2	4	2		2		2	3	3	2	3	1	2	2	2			3	2	4	1	1
22	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2				2	3	3	2	2	1	2	2	1			3	2	5	3	3
23																																							
24	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	3	2	2	2				3	3	2	2	1	2	2	1			2	2	3	3	3
25	3	3	3	3	4	2	3	3	3	3	3	4	3	4	3	3	3	4	3	3	3			3		1	3	3	4	2	3	3	3		4	1	5	4	9
26	3	3	3	3	3	1	3	3	3	3	5	3	3	3	3	3	3	3	3	3	3			3	1		2	5	3	2	3	3	2		4	1	4	4	9
27	2	2	3	2	2	1	3	2	3	5	3	2	2	5	2	2	2	1	2	3	2			2	3	2		2	2	2	3	1			3	3	3	4	9
28	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2					2	3	3	2		2	1	2	2	1		1	2	3	3	3
29	2	2	3	2	2	5	2	2	5	2	2	2	3	2	2	2	3	2	3	2				2	4	3	2	2		3	2	2	1		1	4	1	4	9
30	1	1	1	2	1	1	1	1	1	1	2	1	2	1	1	1	3	1	1	1				1	2	2	2	1	3		1	1	2		2	1	4	2	2
31	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2			2	3	3	2	2	1		2	1			1	2	5	3	3
32	2	2	2	3	2	2	2	2	2	2	2	3	2	3	2	2	2	4	2	2	2			2	3	3	3	2	2	1	2		3		1	2	5	3	3
33	1	1	2	1	1	1	2	1	3	2	2	1	1	2	1	1	1	2	1	2	1			1	3	2	1	1	1	2	1	3			2	3	2	3	3
34																																							
35	3	2	3	3	3	3	3	3	1	2	1	3	3	2	2	1	3	3	3	3	3			2	4	4	3	1	1	2	1	1	2			3	2	9	9
36	2	2	2	2	3	2	2	2	2	2	2	2	3	2	3	2	2	4	2	2	2			2	1	1	3	2	4	1	2	2	3		3		5	8	3
37	3	3	4	3	3	3	4	3	5	3	4	3	3	3	4	3	4	3		3				3	5	4	3	3	1	4	3	3	2		2	5		5	5
38	3	3	3	3	4	3	3	2	3	3	3	4	3	4	3	3	5	3	1	3				3	4	4	4	3	4	2	3	3	3		4	3	5		2
39	3	3	3	3	4	3	3	2	3	3	3	4	3	4	3	3	5	3	1	3				3	4	4	4	3	4	2	3	3	3		4	3	5	2	

Appendix D-4: Distance Matrix for Teachers in
School 5

	1	2	3	4	5	6	7	8	9	10	11
1		2	2	2	2	1	1	2	2	1	3
2	2		1	2	1	2	2	1	2	1	3
3	2	1		2	1	1	1		2	1	3
4	2	2	2		2	2	1	2	1	1	1
5	2	1	1	2		2	2	2	2	1	3
6	1	2	1	2	2		2	2	1	1	2
7	1	2	1	1	2	2		2	2	1	2
8	2	1	1	2	2	2	2		2	1	3
9	2	2	2	1	2	1	2	2		1	1
10	1	1	1	1	1	1	1	1	1		2
11	3	3	3	1	3	2	2	3	1	2	

Appendix D-5: Distance Matrix for Teachers in School 6

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1		3	1	3	1		3		3	4	5	2	3	4		3	4	2	4	4	5	4
2	3		2	1	2		2		2	1	4	3	2	3		2	3	1	3	3	4	3
3	1	2		2	2		2		2	3	4	1	2	5		2	3	1	3	3	4	3
4	3	1	2		2		1		2	1	4	2	2	3		2	3	1	3	3	4	3
5	1	2	2	2			2		2	3	4	3	2	3		2	3	1	3	3	4	3
6																						
7	3	2	2	1	2				2	2	4	1	2	3		2	3	1	3	3	4	3
8																						
9	3	2	2	2	2		2			3	4	3	2	3		2	1	1	3	3	4	3
10	4	1	3	1	3		2		3		5	3	3	4		3	4	2	4	4	5	4
11	5	4	4	4	4		4		4	5		5	4	1		2	5	3	5	5	2	3
12	2	3	1	2	3		1		3	3	5		3	4		3	4	2	4	5	4	4
13	3	2	2	2	2		2		2	3	4	3		3		2	3	1	1	4		3
14	4	3	3	3	3		3		3	4	1	4	3			1	4	2	4	4	1	2
15																						
16	3	2	2	2	2		2		2	3	2	3	2	1			3	1	3	3	2	1
17	4	3	3	3	3		3		1	4	5	4	3	4		3		2	4	4	5	4
18	2	1	1	1	1		1		1	2	3	2	1	2		1	2		2	2	5	2
19	4	3	3	3	3		3		3	4	5	4	1	4		3	4	2		2	5	4
20	4	3	5	3	3		3		3	4	5	4	1	4		3	4	2	2		5	4
21	5	4	4	4	4		4		4	5	2	5	4	1		2	5	3	5	5		3
22	4	3	3	3	3		3		3	4	3	4	3	2		1	4	2	4	4	3	

APPENDIX E

The Influence Domain, Centrality and Prestige
of Teachers in the Schools

Appendix E-1

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE
OF TEACHERS IN SCHOOL 1

Teacher	Influence domain	Centrality index*	Prestige*
1	27	2.62963	0.36670
2	27	3.48148	0.27698
3	27	2.59259	0.37194
4	27	3.00000	0.32143
5	27	2.81481	0.34258
6	0	0.00000	0.00000
7	27	3.33333	0.28929
8	27	4.44444	0.21696
9	27	3.33333	0.28929
10	27	4.25926	0.22640
11	27	3.07407	0.31368
12	27	2.74074	0.35183
13	27	3.37037	0.28611
14	27	3.88889	0.24796
15	27	3.37037	0.28611
16	27	4.51852	0.21341
17	27	3.07407	0.31368
18	27	3.29630	0.29254
19	27	3.48148	0.27698
20	27	3.29630	0.29254
21	27	3.18519	0.30274
22	27	3.37037	0.28611
23	27	3.07407	0.31368
24	27	3.96296	0.24332
25	27	2.88889	0.33379
26	27	3.37037	0.28611
27	27	3.55556	0.27121
28	27	4.33333	0.22253
29	27	4.25926	0.22640

* The maximum centrality and prestige score is 1.00.

Appendix E-2

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE
OF TEACHERS IN SCHOOL 3

Teacher	Influence domain	Centrality index*	Prestige*
1	23	3.65217	0.22491
2	23	3.04348	0.26990
3	23	3.00000	0.27381
4	23	3.39130	0.24222
5	23	3.65217	0.22491
6	23	3.04348	0.26990
7	23	3.91304	0.20992
8	23	4.43478	0.18522
9	23	4.86957	0.16869
10	0	0.00000	0.00000
11	0	0.00000	0.00000
12	23	5.04348	0.16287
13	23	3.56522	0.23040
14	23	3.52174	0.23325
15	1	1.00000	0.03571
16	23	4.39130	0.18706
17	23	4.08696	0.20099
18	23	3.08696	0.26610
19	23	3.04348	0.26990
20	23	2.56522	0.32022
21	0	0.00000	0.00000
22	23	2.47826	0.33145
23	23	3.47826	0.23616
24	23	4.43478	0.18522
25	23	3.26087	0.25190
26	23	2.78261	0.29520
27	23	4.00000	0.20536
28	1	1.00000	0.03571
29	23	5.34783	0.15360

* The maximum centrality and prestige score is 1.00.

Appendix E-3

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE
OF TEACHERS IN SCHOOL 4

Teacher	Influence domain	Centrality index*	Prestige*
1	36	2.13889	0.44293
2	36	2.05556	0.46088
3	36	2.27778	0.41592
4	36	2.08333	0.45474
5	36	2.41667	0.39201
6	36	2.00000	0.47368
7	36	2.27778	0.41592
8	36	2.05556	0.46088
9	36	2.25000	0.42105
10	36	2.27778	0.41592
11	36	2.22222	0.42632
12	36	2.11111	0.44875
13	36	2.38889	0.39657
14	36	2.25000	0.42105
15	36	2.36111	0.40124
16	36	1.97222	0.48036
17	36	2.11111	0.44875
18	36	2.08333	0.45474
19	36	3.11111	0.30451
20	36	2.11111	0.44875
21	36	2.22222	0.42632
22	36	2.13889	0.44293
23	0	0.00000	0.00000
24	36	2.05556	0.46088
25	36	3.11111	0.30451
26	36	2.86111	0.33112
27	36	2.36111	0.40124
28	36	2.08333	0.45474
29	36	2.36111	0.40124
30	36	1.47222	0.64350
31	36	2.08333	0.45474
32	36	2.27778	0.41592
33	36	1.63889	0.57806
34	0	0.00000	0.00000
35	36	2.50000	0.37895
36	36	2.33333	0.40602
37	36	3.33333	0.28421
38	36	3.19444	0.29657
39	36	3.19444	0.29657

*   The maximum centrality and prestige score is 1.00.

Appendix E-4

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE
OF TEACHERS IN SCHOOL 5

Teacher	Influence domain	Centrality index*	Prestige*
1	10	1.80000	0.55556
2	10	1.70000	0.58824
3	10	1.50000	0.66667
4	10	1.60000	0.62500
5	10	1.80000	0.55556
6	10	1.60000	0.62500
7	10	1.60000	0.62500
8	10	1.80000	0.55556
9	10	1.60000	0.62500
10	10	1.10000	0.90909
11	10	2.30000	0.43478

* The maximum centrality and prestige score is 1.00.

Appendix E-5

INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE
OF TEACHERS IN SCHOOL 6

Teacher	Influence domain	Centrality index*	Prestige*
1	18	3.22222	0.26601
2	18	2.44444	0.35065
3	18	2.38889	0.35880
4	18	2.33333	0.36735
5	18	2.50000	0.34286
6	0	0.00000	0.00000
7	18	2.38889	0.35880
8	0	0.00000	0.00000
9	18	2.50000	0.34286
10	18	3.22222	0.26601
11	18	3.83333	0.22360
12	18	3.11111	0.27511
13	18	2.38889	0.35880
14	18	2.88889	0.29670
15	0	0.00000	0.00000
16	18	2.16667	0.39560
17	18	3.44444	0.24885
18	18	1.66667	0.51429
19	18	3.33333	0.25714
20	18	3.33333	0.25714
21	18	3.83333	0.22360
22	18	3.11111	0.27511

* The maximum centrality and prestige score is 1.00.

APPENDIX F

Excerpt from McKay (1971)

Ideal Educational Environments

It was of interest in the present study to advance an ideal

educational environment for schools, to identify schools in the sample

which seemed to exhibit this profile, and to study the teacher-principal

interaction within such schools.

To evolve a hypothetical ideal climate requires consideration of the needs and motivations of those working and learning within the school. A desirable educational environment would be one which would be likely to foster the growth and development of its' students. The environment postulated below represents a desirable direction toward which elementary schools should strive.

Before defining the ideal environment, criteria were established for such terms as high, moderate, or low scores. Given these criteria, summarized in Table 21, an ideal educational environment was postulated as follows.

Alienation -- A low score is desirable on this variable. It is important that students feel involved in school affairs, and that school norms are internalized in their academic and other pursuits. Students must feel the sense of belonging and the accompanying concern for students that is characteristic of schools possessing a low alienation score.

Humanism -- It is crucial that school environments possess a high score on this factor. Reflective of a concern for the integrity and value of the individual, schools must support and inspire creativity in the personal acts of individual student expressions characterized by this atmosphere.

Autonomy -- A moderately high or high score is desirable for this variable. It is important that educational environments support and encourage student independence, and that students are afforded the opportunity to share in the responsibility for their

own learning. It is likewise crucial that sufficient opportu-
nities exist for maturity to be developed through sufficient
interaction with teachers and other adults.

Morale -- Representative of a friendly and cheerful school atmos-
phere, this environment has been described as a happy one in
which learners and teachers have a warm relationship. Students
should possess a positive attitude toward school, and practice
the cooperating behavior associated with such an attitude.
Also, it is important that good relationships exist between
students and teachers. For these reasons, a high score is de-
sirable on this factor.

Opportunism -- Moderately low or low scores are desired on this
variable. Schools must not encourage pupil behavior which adapts
to expediency or circumstance. Nor should one gain social or
academic success by "knowing how to behave" with important or
influential people. We badly need schools which foster honesty
and straightforward behavior, unclouded by the entrepeneurial
activity and political maneuvering characteristic of higher
scores on this factor.

Resources -- A desirable score for this variable is one which is
moderately high or high. It is important that schools offer a
variety of learning resources to their students, including the
availability and friendliness of the teachers. These resources
should, however, be derived from clearly examined goals and in-
structional purposes. While it is important that schools offer

a variety of these learning resources, both human and material,
the quality of the educational environment is not necessarily
predicated upon such a single factor.

When the scores of the thirty-six schools in the sample were
examined, two were found to conform to the requirements of an ideal
educational environment.   Schools 004 and 100 met the established
criteria.   The environment scores for these two schools are displayed
in Figure 5, which also depicts the desirable range of scores for each
educational environment factor.

Figure 5

Variable Scores for Two Schools
Possessing an Ideal Educational Environment
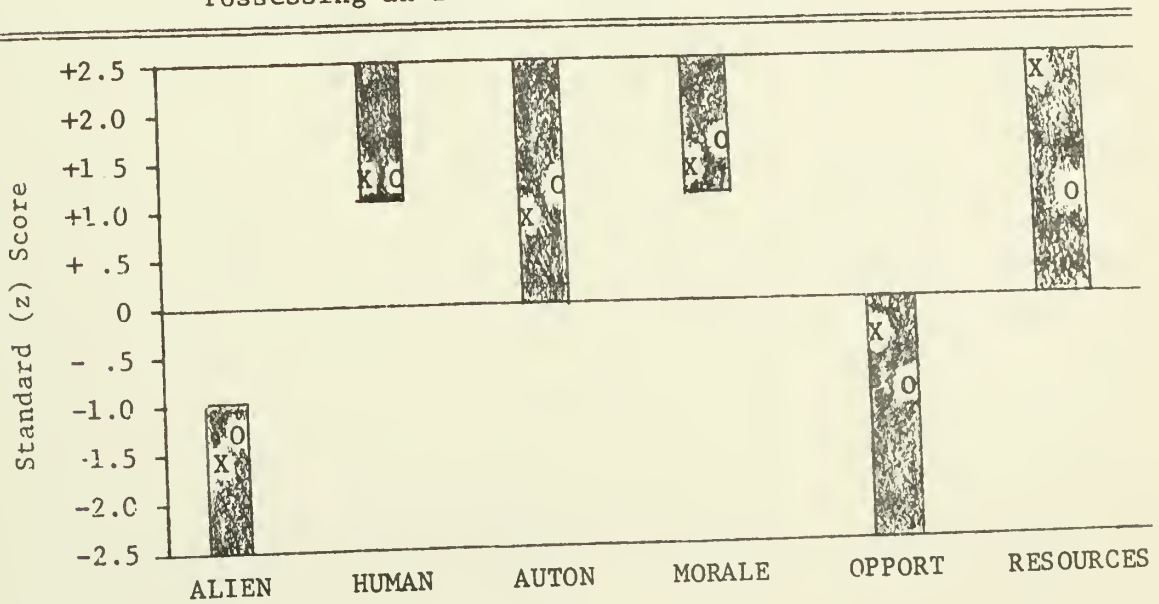
Educational Environment Variable

Legend: ▨ - Range of scores for ideal environment
           X - Scores for School 004
           0 - Scores for School 100

Table 21

Criteria for Terms Used to Describe
An Ideal Educational Environment

Term	Range of Standard (z) Scores	Range of Variable Scores					
		ALIEN	HUMAN	AUTON	MORALE	OPPORT	RESOURCES
High Score: Greater than	+1	38.8	57.0	62.2	59.1	48.8	74.6
Moderately High Score: Greater than	0	32.5	51.4	53.5	51.4	45.8	67.1
Moderate Score: Between	-1 to +1	26.2- 38.8	45.8- 57.0	44.8- 62.2	43.7- 59.1	42.8- 48.8	59.6- 74.6
Moderately Low Score: Less than	0	32.5	51.4	53.5	51.4	45.8	67.1
Low Score: Less than	-1	26.2	45.8	44.8	43.7	42.8	59.6

The teacher-principal interaction in the two schools was then compared
by placing their individual variable scores on a single graph. This
profile is displayed in Figure 6.

Figure 6

Comparison of Teacher-Principal
Interaction in Two Schools Possessing
an Ideal Educational Environment

Teacher-Principal Interaction Variables

Legend: School 004

           School 100
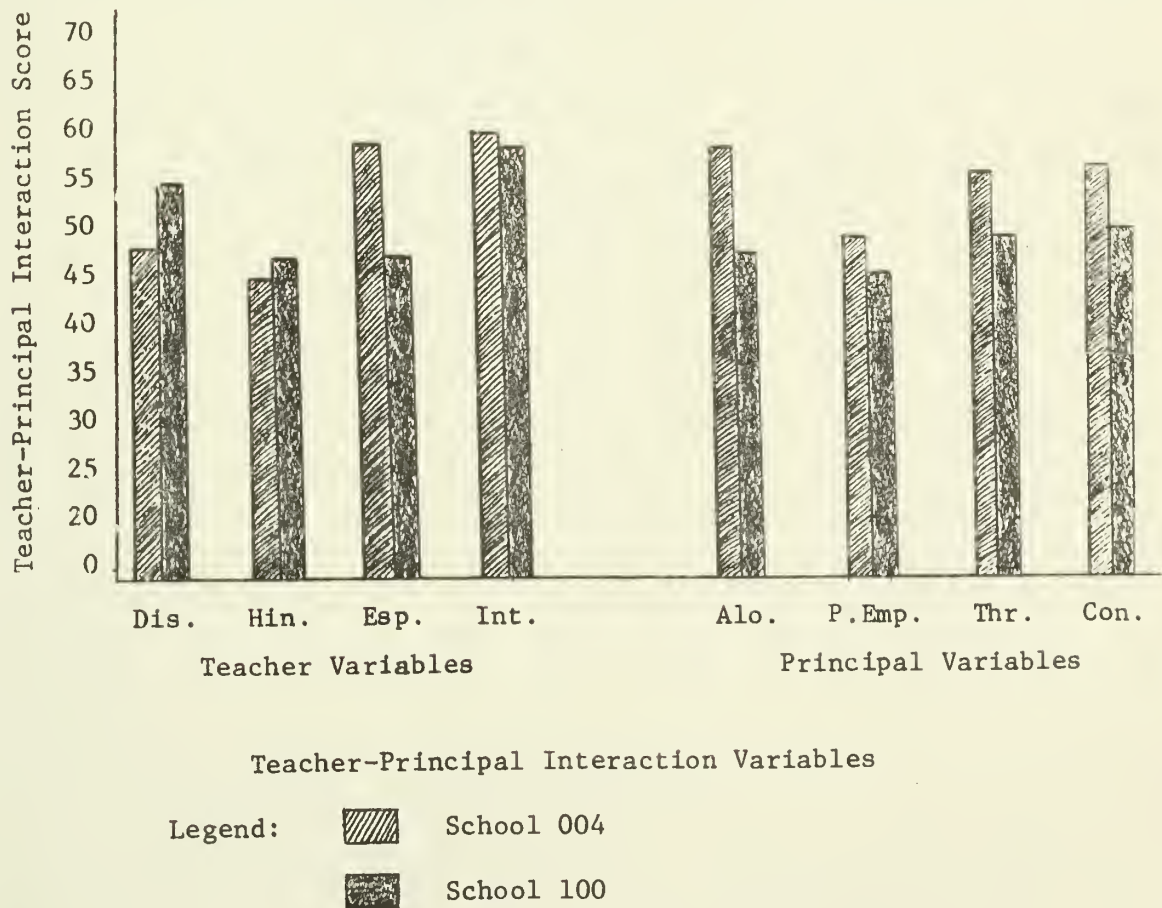
The similarity of the principal and teacher scores for these two schools is striking. Close inspection of Figure 6 reveals that for five of the eight teacher-principal variables, less than one standard deviation separates the scores of the schools. These similarities add visual support for the contention that a relationship exists between desirable educational environments and selected components of teacher-principal interaction.

APPENDIX G

Computational Procedures

Appendix G

COMPUTATIONAL PROCEDURES FOR THE INCIDENCE MATRIX,
INFLUENCE DOMAIN, CENTRALITY AND PRESTIGE

(The following is quoted from Lin 1968, Appendix D)

I. Incidence matrix and distance matrix:

Sociometric data can be converted into a square matrix
in which the cells consist of values of 1's and 0's only.
For a social system of n members, the matrix is a n by n
matrix. Call this matrix A; then a_{ij} (row i and column j)
is assigned a value of "1" if member i nominates member j
and a_{ij} is assigned a value of "0" if member i does not nomi-
nate member j. The initial distance matrix, D, has also n
by n cells, and an ∞ is assigned in all cells.

For instance, given the following initial incidence
matrix and initial distance matrix:

$$
A^1 = \begin{array}{c|ccc} & 1 & 2 & 3 \\ 1 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 \\ 3 & 1 & 0 & 0 \end{array}
\qquad
D = \begin{array}{c|ccc} & 1 & 2 & 3 \\ 1 & \infty & \infty & \infty \\ 2 & \infty & \infty & \infty \\ 3 & \infty & \infty & \infty \end{array}
$$

then, the network represented in A^1 can also be described
in the following sociogram:
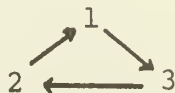
A^2, thus, shows the communication pattern of one-step (ad-
vice seeking) flow. We may say that member 1 exerts influ-
ence upon member 3, member 2 exerts influence upon member 1,

and member 3 exerts influence upon member 2; all in one-step communication flow (or, direct influence). Then, we assign the value "1" (the number of steps) in cells d_{12}, d_{23}, and d_{31} in the distance matrix:

$$
\begin{array}{c c c c}
 & 1 & 2 & 3 \\
1 & \infty & 1 & \infty \\
D = 2 & \infty & \infty & 1 \\
3 & 1 & \infty & \infty
\end{array}
$$

In order to determine who exerts influence upon whom after two steps of communication flow or advice seeking activities, we square the A^1 matrix to obtain A^2 matrix. We compute the values for each cell in A^2 with the operation of regular matrix multiplication first:

$$
a_{ij}^{(2)} = (a_{i1}^1 \cdot a_{1j}^1) + (a_{i2}^1 \cdot a_{2j}^1) + \ldots + (a_{in}^1 \cdot a_{nj}^1)
$$
$$
= \Sigma_{k-1}^n (a_{ik}^1 \cdot a_{kj}^1)
$$

Then:

$$
a_{ij}^2 = \begin{cases} 1, & \text{if } a^{(2)} > 0 \\ 0, & \text{if } a^{(2)} = 0 \end{cases}
$$

Operating on the original matrix A^1 with the above formulas, we obtain matrix A^2:

$$
\begin{array}{c c c c}
 & 1 & 2 & 3 \\
 & 0 & 0 & 1 \\
A^2 = & 1 & 0 & 0 \\
 & 0 & 1 & 0
\end{array}
$$

which indicates that after two steps of flow, the informa-
tion or influence has been transmitted from member 1 to mem-
ber 3 (via member 2), 2 to 1 (via 3), and 3 to 2 (via 1).
Checking the distance matrix D against A^2 we find that the
cells d_{13}, d_{21}, and d_{32} still have a value of infinity (∞).
Thus, we assign a value of "2" (number of steps taken) into
these cells. Now, the distance matrix D is:

$$D = \begin{array}{c c c c} & 1 & 2 & 3 \\ 1 & \infty & 1 & 2 \\ 2 & 2 & \infty & 1 \\ 3 & 1 & 2 & \infty \end{array}$$

Using the same procedure, we find that:

$$A^{(3)} = A^1 \cdot A^2$$

$$a^3_{ij} = \begin{cases} 1, & \text{if } a^{(3)}_{ij} > 1 \\ 0, & \text{if } a^{(3)}_{ij} = 0 \end{cases}$$

$$A^3 = \begin{array}{c c c c} & 1 & 2 & 3 \\ 1 & 1 & 0 & 0 \\ 2 & 0 & 1 & 0 \\ 3 & 0 & 0 & 1 \end{array}$$

and the distance matrix becomes:

$$D = \begin{array}{c c c c} & 1 & 2 & 3 \\ 1 & 3 & 1 & 2 \\ 2 & 2 & 3 & 1 \\ 3 & 1 & 2 & 3 \end{array}$$

which indicates that the distance between any two members is completely known * in general, the maximum number of multiplications to be performed is n-1. In order to assure that the distance between any pair is minimum, d_{ij} can be assigned a value of m if and only if:

(1). $a_{ij}^{m} = 1$; and

(2). $a_{ij}^{k} = 0$ for all $k > m$

II. Influence domain, centrality, and prestige of members:

Influence domain of member 1 (I_1) is defined as:

$$I_1 = \sum_{all\ k} d_{ki}^{1} \quad \text{where} \quad d_{ki}^{1} = \begin{cases} 1, & \text{if } d_{ki} < n \text{ and } k \neq i \\ 0, & \text{if } d_{ki} > n \end{cases}$$

Centrality of member 1 (C_1) is defined as:

$$C = \frac{\sum_{all\ k} d_{ki}}{1_i} \quad \text{where } d_{ki} < n \quad \text{and } k \neq i$$

And prestige of member 1 (P_1) is defined as:

$$P_1 = \begin{cases} \dfrac{I_1}{C_1 (N-1)} & \text{when } C_1 \neq 0 \\ 0 & \text{when } C_1 = 0 \end{cases}$$

---

*When "direct feedback" (loop) is not a crucial variable in an investigation, the diagonal cells should be assigned a value of "0" at all times. In this paper, the diagonal cells assumed "0" in all distance matrices.