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Influence of sex, training and aspiration of innovative and laggard educators upon innovation adoption.

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INFLUENCE OF SEX, TRAINING AND ASPIRATION OF INNOVATIVE AND LAGGARD EDUCATORS UPON INNOVATION ADOPTION

A Dissertation Presented

By

Frank Peter Stetz

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The writing of a doctoral thesis is presumably the product of the candidate. So many others are responsible, though, that credit due can never be adequately expressed to both professional associates and friends.

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Massachusetts (January, 1975)

Directed by: Dr. William C. Wolf, Jr.

Introduction

We have seen in the past ten to fifteen years a superabundance of innovations created and subsequently implemented in our nation's schools. Literature on such innovations is not difficult to obtain; what is surprising, though, is that it is exceedingly more difficult to determine characteristics of those responsible for the acceptance or rejection of implementing such innovations.

Purposes

The purposes of this study are to examine in a knowledge diffusion context the sex, educational level and professional aspirations of some educators classified as innovative and non-innovative. More specifically, the research hypotheses are:

1. There is no significant difference between the number of males and females identified as innovative educators.
2. There is no significant difference between the number of males and females identified as non-innovative educators.
3. There is no significant difference between the arithmetic average of the years of education of persons identified as innovative and non-innovative educators.

4. There is no significant difference between the professional aspirations level of persons identified as innovative and non-innovative educators.

Sample

The data for this study are part of that generated by the Kettering Study of Educational Knowledge Diffusion (Wolf & Fiorino, 1972). The present investigation concerns itself with 200 educators drawn from the original study: the 100 subjects rated most innovative and the 100 subjects rated least innovative. The sample of 200 was determined by means of a weighting system employed by Wolf & Fiorino (1972).

Instrumentation

The two major instruments utilized in this study are the interview inventory created for the original study and a worksheet designed by the author to help identify the sex and training variables and to compute professional aspirations indices.

Data Analysis

The analysis of data includes the following:

1. A tabulation of the number of innovative and non-innovative educators by sex;

2. A tabulation of the number of innovative and non-innovative educators by the number of years of schooling;

3. The computation of the average number of years of education of innovative and non-innovative educators, including the mean and standard deviation;

4. A tabulation of innovative and non-innovative educators by professional aspirations; and

5. Tests of significance where they are deemed appropriate to determine the probability of whether the results occurring could be on the basis of chance alone.

Supplementary analyses are also included which further dichotomize the education and professional aspirations variables by sex.

Results

The results of the investigation show that:

1. There is not a significant difference between the number of males and females identified as innovative educators in this sample.

2. There is a significant difference between the number of males and females identified as non-innovative educators in this sample.

3. There is a significant difference between the arithmetic average of the years of education of the innovative and non-innovative educators in this sample.

4. There is not a significant difference between the professional aspirations level of innovative and non-innovative educators in this sample.

TABLE OF CONTENTS

Page

CHAPTER III

CHAPTER IV

CHAPTER V

APPENDICES

LIST OF TABLES

CHAPTER I

CHAPTER I

INTRODUCTION TO THE STUDY

The Problem

We have seen in the past ten to fifteen years a superabundance of innovations created and subsequently implemented in our nation's schools. Such things as educational television, differentiated staffing, team teaching and computer-assisted instruction, to name but a few, are products of educational technology during the sixties and early seventies.

Literature on such innovations is not difficult to obtain: educational journals abound with information describing theory, assumptions and implementation techniques for those interested. While most schools take part in some sort of innovation adoption at some level, it is interesting to note that many innovations tried and utilized for a period of time fall by the wayside after expected gains are not realized. Is this the fault of the innovations? Or could the problem rest in poor implementation by personnel non-innovative in outlook?

Regardless, while we know or can easily find out after a reasonable length of time the "track record" of most innovations, it is exceedingly more difficult to find out characteristics of those who are responsible for the acceptance or rejection of implementing such innovations. While innovations may come and go, educators responsible for such implementation are much more enduring.

In this day of rapidly growing technical expertise more and more people are being given the label of innovator. What characteristics must one possess to be included in this category? While this problem has been researched by rural sociologists for over thirty years, the field of education has not shown as much interest in the characteristics responsible for innovative behavior. Stated differently, through the work of rural sociologists we have come to know what general characteristics make up an innovative farmer; we are not as well informed about what makes up an innovative teacher, administrator, supervisor, or teacher educator.

It is the author's intention in this study to examine some basic characteristics of educators identified as innovative and non-innovative by a study of educational knowledge diffusion and utilization directed by Wolf and Fiorino (1972), and funded by the Kettering Foundation. The research team accumulated a data bank on 595 individuals interviewed during the period of 1966-1968. While reports and studies have been generated on various aspects of the data (see, for example, Appendix B) certain important variables have until now gone without analysis.

The three characteristics the author will pursue in this study are sex, educational level and professional aspirations. The questions the author will explore include: 1) Are a greater number of males identified as innovative educators than females? 2) Are a greater number of males identified as non-innovative educators than females? 3) Is the arithmetic average of the number of years of education of

educators identified as innovative greater than the arithmetic average of the number of years of education of educators identified as non-innovative? And finally, 4) Do educators identified as innovative demonstrate a higher level of professional aspiration than educators identified as non-innovative?

Significance of the Problem

The primary significance of this study is that, to the author's knowledge, the sex variable has not usually undergone intensive analysis as a direct independent variable in educational knowledge diffusion and utilization studies. While Erasmus (1952) and Loomis (1967) have observed the attitudes and beliefs of both males and females in rural sociology studies, few comparable studies have been done in the field of education.

In this enlightened era of women's rights and equal employment opportunities, it is deemed important to understand the relationship of female adoption behavior to the study of innovation adoption. While taking into consideration the changing makeup of elementary and even secondary schools, with its increased employment of male faculty members, the fact remains that most teachers on the elementary level, at least, are female. Their influence on school practice cannot be neglected as inconsequential. If adoption behavior between males and females is different for some generic or social reason, then this fact should be taken into consideration when innovation projects are undertaken.

A second point of significance of this study is that at the present time rural sociology studies have advanced to the point where research findings have generalized certain notions about innovation behavior and adopters' education and aspiration levels. In the field of educational knowledge diffusion and utilization, the process has been much slower. This study is seen as a significant contribution to a body of knowledge on educational innovations adoption.

In further consideration of this second point, it is important to analyze whether the generalizations reached in other disciplines, most notably rural sociology, can be generalized to education. Eichholz and Rogers (1964) claim that while education diffusion studies have contributed much in the way of understanding the communications of educational innovations, they have paid "no close attention to any other diffusion tradition." Miles (1964) states that educational diffusion strategies should utilize the thirty years of rural sociology research in studying the "innovative personality." Only through continuing research in education based upon the generalizations of rural sociology can we discover if these generalizations hold true for education. It is in this way that some day it may be possible to talk about generalizations transcending disciplines.

A third point of significance of this study is the potential of isolating certain characteristics hypothesized to be associated with innovativeness. It is important to identify educators innovative in nature and give them the charge and responsibility of implementing

innovations, for it is they who are dedicated to the principle of innovative change for improvement.

The Study

This study will examine the sex, educational level and professional aspirations of the 100 educators classified as most innovative and 100 least innovative (or laggard) from an original sample of 595 interviewed educators.

The four null hypotheses under study are:

1. There is no significant difference between the number of males and females identified as innovative educators.
2. There is no significant difference between the number of males and females identified as non-innovative educators.
3. There is no significant difference between the arithmetic average of the number of years of education of persons identified as innovative and non-innovative educators.
4. There is no significant difference between the professional aspirations level of persons identified as innovative and non-innovative educators.

In addition to the four research hypotheses stated above, additional supplementary analyses will be conducted upon the third and fourth hypotheses. These two hypotheses will be further dichotomized by sex to analyze 1) educational level by type and sex of educator and 2) professional aspirations by type and sex of educator.

The Kettering Study of Knowledge Diffusion and Utilization

A description of this study is included due to the fact that the present study analyzes certain segments of the data gathered originally for the Kettering Foundation. A more detailed description of specific hypotheses and reported results and conclusions are included in Chapter III.

During the period of 1966-1968 data were gathered by a group of researchers for the purpose of probing the following (Wolf & Fiorino, 1972):

1. The extent to which teachers, supervisors, administrators and teacher educators (a) had adopted innovations within the past year or so, (b) planned to adopt innovations within the next year or so, or (c) had tried but failed to adopt innovations within the past year or so in their personal practice.

2. Influences of recognized diffusion agents upon the adoption of innovations (i.e., practices, products and ideas that are new to the practitioner) to the personal practice of teachers, supervisors, administrators and teacher educators.

3. Characteristics of selected target audiences (level of experience, years of professional experience and earned academic credits) in relation to the adoption of innovations to personal practice.

4. Characteristics of selected diffusion strategies (style, duration and audience size) in relation to the adoption of innovations to personal practice.

5. Relationships between five distinguishable stages of innovation adoption reported by Rogers (1962), Lionberger (1968) and others, and the adoption process described by randomly selected educators (p. 17).

The research team contacted 21 diffusion agents "which seemed representative of those currently employed in the field of education."

Wolf and Fiorino (1972) go on to state that "no formal criterion was structured as the basis for selection; rather, factors such as extent of impact, data accessibility, and level of education treated, served as operating criteria."

The diffusion agents included are described as follows (Wolf & Fiorino, 1972):

1. Association for Supervision and Curriculum Development (ASCD) Institutes (N=60). Complete lists of participants who attended four ASCD Regional Research Institutes in Denver, Detroit, Minneapolis, and Washington, D. C. were obtained. From these lists, 30 names and then 15 names from the 30 were randomly selected for each institute, after deleting participants residing west of the Mississippi River. (One exception was the Denver meeting, from which participants west of the Mississippi were selected.)

2. National Defense Education Act Summer and Academic Year Institutes (N=120). Complete lists of participants who attended six summer and six academic year institutes in English (University of Virginia and Middlebury College), reading (Howard University), German (Albright College), guidance (University of Georgia), cultural deprivation (New York University and Bank Street College) were obtained. The summer institutes were selected randomly from a list of completed institutes, whereas the academic year institutes constituted the complete range of coice offered by representatives of the Research Training and Dissemination Division of the U.S.O.E. From these selections the researchers arbitrarily selected four summer and four academic year institutes. They then randomly selected 30 names, and then 15 names from the 30 per institute after deleting participants residing west of the Mississippi River.

3. Professional publications (N=250). Complete lists of subscribers for Elementary English and The Instructor were obtained. From these lists 100 names, and then 50 names were randomly selected from the original 100. The editors of the Saturday Review, School Science and Mathematics and the National Elementary Principal, at the researchers' request, offered a randomly selected list of subscribers. From these lists 100, and then 50 of the original 100 names were randomly selected.

4. Annual professional meetings (N=200). Administrative officers of the Association for Supervision and Curriculum Development, the National Association of Elementary School Principals and the Association for Childhood Education International made available complete lists of registered participants attending the organization's last professional meeting. From these lists 100 names and then 50 names from the original 100 names were randomly selected. The executive secretary of the International Reading Association, at the researchers' request, mailed a randomly selected list of conference participants. From this list 100 names and then 50 names of the original 100 were randomly selected (pp. 8-9).

The subjects selected for interviews were chosen because of their exposure to these particular diffusion agents. The original sample was 100% larger than what was considered necessary for the study. This was done to insure that such negative effects as subject apathy, change of address, etc., would not diminish the pool of participants to the point of requiring a new sample. From the original number of possible interviewees, the desired subjects were randomly selected.

"There were 630 interviews possible, given a 100% positive reaction to the researchers' initial request for help. In fact, 875 contacts were made in all. These contacts yielded 595 completed interviews, or a 68% return for the energy expended. Of the 595 sample subjects, 283 were men and 312 were women. The quota set for five of the sub samples was not met, whereas in thirteen instances an excess of interviews were completed. These variances were not considered to be deleterious to the study intentions (Wolf & Giorino, 1972)."

The randomness of the study is open for question for three reasons:

1. Some of the lists were generated by the diffusion agents; hence it was not possible to insure that the lists generated were truly random in nature.

2. Subjects identified by the diffusion agents living in geographically isolated areas were not chosen for the study. Due to budget limitations, the study sample was biased in favor of those residing in or close to urban areas.

3. Subjects were selected because of their exposure or involvement with one or more diffusion vehicles. Hence, there exists the possibility of a systematic bias in favor of "more innovative" people.

The study was conducted by a staff composed of: Two co-directors, six full-time interviewers, one combination secretary-interviewer, an interview trainer, an office manager, and a project advisory council.

The interview instrument, a copy of which is included in Appendix A, was designed to gather demographic data in addition to its main purpose of eliciting responses to questions regarding known, adopted, about to be adopted and non-adopted innovations. Additional questions probed reasons for the described behavior of the interviewee. Additionally, a section of the instrument was devoted to questions pertaining to the extent to which the diffusion agents had a marked effect on the interviewee.

Each sample subject was first contacted by mail to describe and stress the importance of the study in addition to setting up a tentative interview date. 875 mailed introductions yielded 595 completed interviews. Each interview was tape recorded, transcribed to the interview instrument and later coded and stored for subsequent analysis.

A program was then prepared by the University of Massachusetts Computer Center to compute the following analyses (Wolf & Fiorino, 1972):

1. Summarize information pertaining to each of the survey inventory items;
2. Relate these summaries to characteristics of the study sample and to the diffusion agents;
3. Obtain and then rank the index of innovativeness for each subject, draw out the 50 highest and the 50 lowest scores, then summarize in terms of five considerations; and,
4. Obtain and then rank the composite indices of innovativeness for each source of data (all subjects within each source of data), draw out the five highest and five lowest composite scores then summarize in terms of three considerations.

Item three above provides the sample for the present study which will analyze those identified as the 100 most and 100 least innovative educators in the Kettering study.

Definition of Terms Used in the Study

Several terms that will be used throughout the remainder of this study deserve special attention. To avoid confusion and ambiguity they are defined as follows:

Innovation - an idea, practice or object perceived as new by an individual.

Innovative educator - for the purposes of this study, those persons included in the Kettering Study for Educational Knowledge Diffusion and Utilization who scored among the 100 highest individuals due to their responses to inventory questions concerning the number of innovative ideas, products or practices they had adopted, planned to adopt, or would like to adopt but had been unable to do so. The weights assigned for various innovative activities were arbitrarily chosen by the researchers.

Laggard (or non-innovative) educator - for the purposes of this study, those persons included in the Kettering Study for Educational Knowledge Diffusion and Utilization who scored among the 100 lowest individuals due to their responses to inventory questions concerning the number of innovative ideas, products or practices they had adopted, planned to adopt or would like to adopt but had been unable to do so.

Professional aspirations - for the purposes of this study, professional aspirations is defined as the desire and drive for more education, a more prestigious position, attendance at more brief and extended assemblages and subcription to more professional journals than someone with lower professional aspirations. The 100 most and 100 least innovative subjects will be analyzed by their responses to the questions of educational level, occupation, attendance at brief and extended assemblages and subscriptions to professional journals.

Responses will be coded and weighed and an index of professional aspirations will be computed. The weights assigned were arbitrarily chosen by this author.

Organization of the Dissertation

The second chapter of this thesis will encompass a review of selected research and related literature. This review will include a brief introduction; a section dealing with rural sociology studies that have examined the variables of sex, educational level and aspirations; and finally, a section devoted to diffusion studies in education which have reported results on sex, educational level and aspirations.

Chapter Three will contain a description of the relevant procedures and methodology employed in this study. Included in this chapter will be a description of the purposes of this dissertation; a more detailed look at the Kettering Study of Knowledge Diffusion and Utilization emphasizing the hypotheses studied and results and conclusions reached; a description of the thesis procedures for this dissertation, including specific hypotheses, population, instrumentation, data collection and analysis; and limitations to data interpretation.

The fourth chapter will consist of the analysis of the data and statement of the results of the study. Additional analyses will be conducted upon the variables of educational level and aspirations. The additional results will be reported in this chapter also.

Chapter Five will begin with a summary of the study's results. Conclusions based on these results will be reported. Finally, an implications for further research section will be included to respond to some of the issues raised by this study.

Appendices will be included and contain: a copy of the Kettering Study interview inventory, a listing of questions probed to date by various researchers utilizing the Study data, a table of diffusion agents selected for the Study and a tally of the subjects contacted and interviewed by sub sample for the original Kettering Study.

The journalistic style to be followed in this dissertation conforms to the standards of the American Psychological Association (1967). In addition, this dissertation also follows the guidelines set forth by the Graduate School of the University of Massachusetts (1974).

CHAPTER II

CHAPTER II

Review of the Literature

Selected literature including related research is reported in this chapter. The sources included are those that pertain to the questions under study: whether male or female educators demonstrate a higher degree of innovativeness; whether educational level is an important characteristic in determining the innovativeness of an educator; and whether educators classified as innovative have higher professional aspirations than those classified as laggard.

The literature reported conforms to the following criterion. Only those studies which deal with 1) the variables under study and 2) diffusion research in rural sociology and education are included. Literature dealing with the sex variable in either discipline was found to be scarce; those studies that are deemed of any relevance are included.

The primary reason for the inclusion of rural sociological research into a literature review on educational diffusion and utilization pertains to the vast number of studies completed by rural sociologists on the problems under study. Rogers (1962) claims that the rural sociological research tradition has produced over 300 studies, beginning with the Ryan and Gross (1943) study of the spread of hybrid corn seed in Iowa. Such an abundance of knowledge diffusion studies provides the rationale for their inclusion here.

Keeping the above point in mind, the inclusion of rural sociological data may be open for criticism by some authorities because it is

believed that there is a lack of communications between the rural sociology and education disciplines. This lack of communication is due to three problems: a lack of awareness of one tradition for the other, an isolation of one research tradition from the other or what Katz (1961) calls "academic inbreeding," and a difference in the research traditions themselves. These differences are believed to be caused by the difference in approach that the disciplines utilize in conducting their studies. In the early years, most educational diffusion studies were completed under the direction of Paul Mort (Mort & Cornell, 1938) at Teacher's College, Columbia University. The usual method consisted of mailed questionnaires; the unit of analysis being the school system. Early rural sociology studies were not based in one geographical area; their data gathering techniques consisted of personal interviews; and their unit of analysis consisted of the individual farmer.

There are additional reasons why diffusion findings in education are not at the present time directly generalizable to other disciplines, most notably rural sociology. Guba (1965) aptly states some of these reasons as follows:

1. In most reported research, the change or motivation in question is accepted or rejected by an individual entrepeneur (e. g., farmer); in education we are concerned about acceptance by an agent of a bureaucratic social system.

2. Decisions for change that have been studied are typically individual or family decisions; in education we are concerned with collective social systems.

3. Sources of information about innovations in many study areas are well institutionalized (e. g., agricultural extension); this is not true for education.

4. Most innovations in other fields are based on research evidence and are thoroughly tested before being made generally available (e. g., through the agricultural experimentation station); this is not true in education.

5. Most innovations in other areas are diffused through institutional change agents (e. g., the county extension agent); few institutionalized change agents exist in education.

6. The incentive for the adoption of most studied innovations is economic (e. g., more bushels per acre); the economic incentive, while not eliminated in education, is replaced to a certain degree by social motive.

Guba's position is supported by research conducted by Eichholz and Rogers (1964) and Miles (1964). Both stress the importance of educational diffusion strategies utilizing the individual educator as a unit of analysis, following the lead of other research traditions instead of the less appropriate school system unit of analysis.

Turning back to the justification for inclusion of rural sociological studies, although it has been shown how rural sociology and education diffusion strategies have differed in the past, there are some unique commonalities which justify the reliance upon certain basic generalizations as a baseline for this study. Eichholz and Rogers (1964) point out that both traditions share such common elements as:

1. The innovation, defined as an idea perceived as new by the individual.

2. The communication of the innovation from one individual to another.

3. The diffusion (defined as the process by which an idea spreads) of an innovation through a social system defined as a population of individuals. The social system may be comprised of farmers, aborigines, doctors or teachers.

4. Diffusion occurs over time. Not all individuals adopt an innovation at the same time, and can therefore be categorized according to the rate they adopt an innovation. Adopter categories are innovators, early adopters, early majority, late majority and laggards or non-users.

5. The time at which any given individual becomes an actual adopter depends upon two factors: (1) how quickly he passes through the forms of adoption and rejection (ignorance, suspended judgment, situational, personal, and experimental) and (2) the predisposition of the individual to either the adoption or the rejection process.

Studies on Selected Characteristics of Innovators and Innovations Conducted by Rural Sociologists

To provide a context for the discussion of the research conducted in the area of rural sociology a brief overview of the field is in order. Additionally a summary of what is considered a classic study of diffusion in rural sociology will be included.

The Subcommittee on the Diffusion and Adoption of Farm Practices of the Rural Sociological Society (1952) conducted an intensive review of research studies completed within a ten year time span. Their final report, "Sociological Research on the Diffusion and Adoption of Farm Practices" summarized findings in the field as follows:

1. The acceptance of farm practices appears to be a function of status, role and motivation.

2. The differential acceptance of farm practices appears to be a function of socio-cultural systems.

3. Diffusion is seen as a study of cultural change.

4. Diffusion is seen as a problem of communication of information.

Herbert Lionberger (1964) summarized eight additional points as being important in understanding change in rural sociology:

1. Personal characteristics of the acceptor, such as age, education, income, socioeconomic status, prestige, mental flexibility, managerial ability, capacity to discriminate, ability to deal with abstraction, rationality, and attitudes toward farming, science, and change in general.

2. Position of the individual in the social and communicative structure, with particular reference to his being mentioned as associate and best friend and as a source of farm information.

3. Identification with or membership in various types of formal, locality, kinship, reference and clique groups, and clique-like social arrangements.

4. Group norms relative to the acceptance of changes in farm practices, the value placed upon security, the assumption of risks, remaining free of debt, farming as a way of life, etc.

5. The inherent characteristics of the innovation itself as, for example, cost, complexity, divisibility, or compatibility with existing modes of behavior, thought, feeling; also, the individual's perception of such characteristics as opposed to actual situation.

6. Exposure to various types of mass media, personal and institutional sources of farm information through inter-personal communicative methods.

7. Situational factors relating to the farming unit, such as size and kind of operation, the role of the family members in farm management decisions, the locus of authority for making decisions, the degree to which authority is shared by members of the family, and the collective goals of the families involved.

8. The recognition that the adoption of improved farm practices is ordinarily a part of an organized effort to implement change and that people respond to change agents as well as to the ideas presented, the role of such change agents in the adoption process, and their personal characteristics relevant to adoption behavior.

The subsequent review of research in both rural sociology and education will deal primarily with the first, third, fifth and sixth points outlined above.

Our attention now turns to what has been referred to as the premier rural sociological diffusion study conducted by Ryan and Gross (1943). It is this study which has acted as a model for most studies that have followed it in the last 30 years. The unit of analysis was the individual farmer; the investigation was limited to those farmers who had more than 20 acres and who had adopted hybrid seed corn before any full-scale attempt had been made to disseminate the innovation on a large scale. The researchers' data collecting technique consisted of personal interviews; they contacted 345 farmers in two small Iowa communities. The dependent variable under study was the farmers' innovativeness as evidenced by his use of hybrid seed corn. A secondary concern of the investigators was when such use was initiated.

Gulesian (1970) reports that the major findings of the Ryan and Gross study led to:

1. Information about the time differential in adoption of the innovation, leading to theories regarding adopter categories.

2. Information regarding the social characteristics of the farmers, such as age, social status, and cosmopoliteness in regard to innovativeness.

3. Theories regarding stages of the adoption process, i.e., awareness, trial, and adoption.

4. Information regarding the time which elapsed from awareness to adoption.

5. Information regarding the courses of information which the various categories of adopters used in learning about the innovation (pp. 22-23).

Gulesian goes on to state that "using the Ryan and Gross study as a basis, rural sociology generated studies involving research in the

individual adoption process, information sources and media as change agents, the roles of special functionaries in the diffusion process, and inquiries into the social factors in diffusion, the cultural factors in diffusion, and the situational factors in diffusion."

It is at this point of departure that we will examine some of these offshoots of Ryan and Gross' work. While some areas do not concern the variables under study, all attempts will be made to review those studies of most interest to the problems at hand.

Sex of innovator. A comprehensive search of the literature for research dealing with the sex variable has revealed the fact that studies concerning the sex of innovators have not been reported to as great an extent as those dealing with other personal variables such as age, educational level, aspirations, etc. Two very interesting studies are reported below, though.

Loomis and his associates (1966) examined in the context of systematic linkages, Mexicans and Americans in conflict with one another. Variables such as interaction and liking of the citizens of Mexico and the United States for one another, across a mutual boundary were studied with an effort to find out how to increase liking and decrease hostility. The most interesting result of the study concluded that "...women, on the whole, showed greater social distance and less desired linkage than did men, and also had fewer behavioral linkages." Loomis (1967) concludes that "...women emerge.... as the bearers of traditional culture."

Erasmus (1952) conducted a study to assess "...to what extent can we truthfully say that backward people think differently from ourselves, that their knowledge and beliefs are less empirical, that a transition from magic to science represents progress or that an evolutionary concept of knowledge must be unilinear and ethnocentric?" He conducted his experiment on the study of folk versus modern medicine in three districts of Equador. The data of most interest was gathered with the use of tests, generated from interview data, and given to grammar school children. An interesting result of the administration of the test was that in the grammar school class that was asked to designate which illnesses could be cured at home and which by a doctor, the boys showed a greater dependence on the specialist while the girls had more faith in the home remedies they had learned from their mothers. Although the results of this study are open to question as to the research design and instrumentation, this finding is interpreted generally to be an indication that the females sampled tended toward more traditional solutions to problems and did not seek solutions which were implemented by outside innovators. As in the Loomis (1966) study, the female is represented as more traditional than the male.

Educational level of innovator. Gross (1949) has reported data on the discriminatory characteristics of accepters and non-accepters of an approved technological hog sanitation practice known as the McLean system. His primary concern was what characteristics differentiate and do not differentiate accepters and non-accepters of this innovation. The sample consisted of all farm operators in two highly

urbanized Iowa agricultural communities who had the opportunity and the ability to accept the approved farm practice. Gross' results on educational level revealed "the accepters had a significant higher educational level than the non-accepters. Seventeen percent of the accepters as compared to only seven percent of the non-accepters had taken some college work." Fifty-nine percent of the accepters as compared to 41 percent of the non-accepters had done work in grade school.

Gross and Taves (1952) completed a study comparing accepters and non-accepters on ten extension-recommended practices. The ten practices included 1) separating chicks from hens; 2) following a rotated grazing program; 3) using the McLean system of hog sanitation; 4) culling hens; 5) earmarking pigs; 6) providing a protein supplement for hogs; 7) using tractor power; 8) buying sexed chicks; 9) planting a flax crop; and 10) using a mechanical corn picker. Once again the sample consisted of farm operators in two urbanized Iowa communities. Their results showed that in their sample educational level could discriminate between accepters and non-accepters on eight of the ten approved practices. The two innovations where adoption was not readily discriminated by educational level were buying sexed chickens and growing a flax crop.

In a study on farmers in the Netherlands, van den Ban (1957) questioned whether because of a very different cultural pattern more progressive and less progressive farmers could be identified by socio-economic and psychological characteristics as is done in the United States. The general hypothesis was that "...the frames of reference

of farmers materially affect the extent to which they adopt improved farming practices or become 'progressive.'" Summarizing, the study included 5,429 farmers in 25 communities. Instrumentation included rating forms, schedules and interviews. Additional data were gathered from census reports, membership lists of farmers' organizations and cooperatives and persons acquainted with the farmers in the sample. With regard to the variable of education, van den Ban states: "In this and many other respects, the findings are approximately the same as those in the United States. The progressive farmers are...better educated...(and) have a higher social status."

Madigan (1962) conducted research on 23 variables believed to be associated with receptivity to community-development innovations. The work took place in four villages of Cagayan de Oro, a city of Northern Mindanas, the Philippines. In all, 519 males of working age (15 years old and above) and female household heads completed interviews. Thurstone and Likert scales were developed to measure receptivity to community-development innovations, democratic leadership preference, and degree of authoritarian personality. Highest Grade Completed and Preference for Democratic Type Leadership in Job Tasks were the variables found to be most closely associated with receptivity. In terms of differentiating receptive and non-receptive villages, the receptive person is typically literate and has enjoyed schooling.

Singh (1965) reported similar findings concerning educational level and receptivity to innovation adoption in his study of practice adoption in a program of planned change conducted in the Ludhiana dis-

trict of Punjab State, India. The major dependent variable was time of adoption of commercial fertilizer. A sample of 260 full-time farmers was randomly selected from 26 villages in two blocks in the Ludhiana district. Punjabi farmers who adopt the use of commercial fertilizer early as compared with those who are late or non-adopters have more years of schooling and reported that if their yearly income were to double, they would use the extra money to educate family members.

In an interesting study concerning the prediction of farm practice adoption, Lackey (1958) performed a study in upstate New York using data which were collected on identical farm practices in 1947 and 1957. Part of the problem dealt with the question of how consistently do sociological variables predict the adoption of farm practices over time and for different farm enterprises. "Adoption scores were computed for farmers who had a dairy enterprise, a poultry enterprise, and/or a sheep enterprise and classified into high, medium, and low categories of adoption. A battery of variables was used in predicting adoption for each set of practices and for each time period. The technique employed in making these predictions was the coefficient of relative predictability." The findings of this study show that the farmers who maintained their enterprises over the ten year period, in relation to the total population in 1947, had more education, a greater knowledge of the extension service and more exposure to information sources. The consistency in the predictive efficiency was demonstrated through an average rank correlation coefficient of .69.

Katz (1962) conducted a comparison on two studies in the field of knowledge diffusion: the Ryan and Gross (1943) hybrid seed corn study and the study of how doctors in four communities responded to the availability of a new "miracle" drug (Menzel & Katz, 1955; Menzel, 1962; Menzel, Coleman & Katz, 1959; Coleman, Katz & Menzel, 1957; Coleman, Menzel & Katz, 1959). (Since the Ryan and Gross study was discussed in a previous section of this chapter, we will turn our attention toward the latter drug study.) Interviews were conducted with all doctors in four communities for whose practices the new drug was relevant. While it was expected that all members of the sample would be well educated, other influences on those classified as innovative (as opposed to non-innovative) doctors point to the fact that education played an important part in the decision to adopt. Of most interest is the innovative doctors' concern for "scientific orientation", an attitude which also implies an openness to change. The researchers conducting the drug study constructed an index of "scientific orientation" incorporating doctors' concerns toward research, exchange of scientific information and scientific reliability of information. The results reveal that the more scientifically oriented doctors adopted the "miracle" drug earlier, "despite the greater caution which one also associates with scientific orientation." The three variables used in assessing "scientific orientation" all point to a more broadminded, less provincial attitude associated with more knowledge and a higher educational level.

In 1950 Marsh and Coleman (1955) interviewed farm operators in Washington County, Kentucky with respect to certain personal and social

characteristics and farm practices used. The analysis of the data showed that twelve of the farm practices surveyed were significantly associated with nine measures of farmers' personal and social characteristics. (One of the personal and social characteristics significantly associated with adoption was educational level.) Since many of the characteristics were inter-correlated, they examined "the relation of three of them - education, socioeconomic status, and contact with agricultural agency representatives - to the adoption of each practice with each of the other two factors held constant (successively, not simultaneously)." The partial relationship of adoption to each of the three characteristics was found to be "in the same direction as the simple cross-tabulations."

Coughenour (1960) in commenting upon the Marsh and Coleman study recognized that their findings were not related to an empirical theory of practice adoption. He states three purposes for the research he conducted: 1) "To present a conceptual framework for developing an empirical theory of practice adoption...", 2) "To examine the usefulness of the proposed model in guiding the analysis of data obtained in a second survey of farm operators in Washington County..." and 3) "To provide the basis for a more general explanation of the Marsh and Coleman findings..." As was true with the Marsh and Coleman study, Coughenour interviewed all farm operators in 12 neighborhoods of Washington County, Kentucky for the purpose of studying the factors relating to practice adoption. "These neighborhoods were selected to represent the range of general corn, tobacco, and livestock farming in

the county. Of the 451 farm operators interviewed in both surveys, 285 were interviewed twice." In both the Marsh and Coleman "controlled analysis" dealing with educational level and socioeconomic scores and the Coughenour analysis, the findings are consistent. Elaborating on this point, "Marsh and Coleman...(found) that the partial association between practice adoption and socioeconomic scores and education are smaller than the simple associations between practice adoption and each of the latter two factors...this supports... (Coughenour's) hypothesis that socioeconomic status and education provide situational support leading to contact with agricultural agencies and, subsequently to practice adoption."

Finley (1968) validated a prediction instrument for adoption behavior from a statewide random area sample by testing it with data available from the same sample at a second point in time and from countywide samples within the same state. The research method utilized in constructing the instrument was the configuration or prediction by classification method developed by Stuckert (1958). This method was "designed to predict a criterion with discrete categories from a set of discrete or continuous factors on the basis of the principle of maximum probability." Unlike prediction by measurement, this configurational method makes no advance assumptions about the data such as a single set of predictors being best for all individuals in a population or that predictive factors are general and universal throughout a population. The major issue that the Stuckert method of configurations is concerned with is reducing predictive error to a

minimum. It was found that educational level was the third strongest predictive variable of innovativeness just behind social class and productive man work units. The overall predictive accuracy was then computed. "Of the total sample of 104 farmers, 88 were predicted correctly...(with) an average predictive accuracy of .846, which when rounded equals the desired predictive accuracy which has been set at .850."

Copp (1958) attempted to generalize findings in farm practice research through parallel analyses of two distinct sets of data by means of similar concepts, measures and statistical techniques. The data were obtained from two samples drawn from quite different geographical regions, types of farming areas and subcultures. One sample consisted of 157 beef producers in the Flint Hills grazing area of Kansas; the other sample consisted of 177 southern Wisconsin dairy farmers. Both samples were restricted to include only operators producing beef or milk for sale. In each study the dependent variable, adoption of recommended farm practices, was correlated with a number of relevant economic and sociological variables such as: gross farm income, size of farm, number of cattle, age, education, etc. The correlations indicated the relevance of the farm operator's social characteristics for adoption behavior. "The farm operator's place in the social structure as indicated by his age, education, level of living, and activity in community affairs is definitely associated with his adoption behavior. In addition the degree of correspondence in the size of the respective zero-order correlations in the two samples

showed that in no instance are there statistically significant differences between comparable correlations." The results of the multiple correlation analyses in the two samples were in agreement in showing that measures of economic productivity and personality variables were of outstanding importance in accounting for variance in the quantitative measures of farm practice adoption.

While not in the context of farm practices, but associated with the acceptance of recommended health care measures by rural people, Lawry, Mayo and Hay (1958) tested the general hypothesis that "there is an association between indices of social and economic status and the adoption of recommended health care measures by rural people." The general procedure consisted of constructing an index of adoption of recommended health care measures which was then related to a series of social and economic factors. The random sample consisted of 611 households in two rural counties in North Carolina, Stokes and Montgomery. (It should be pointed out that neither county contained an urban center but both had a health department and a fairly new hospital.) The data were gathered by means of a personal interview technique. For the analysis of data, two statistical measures were examined. These were the frequency distribution of adoption scores and the median adoption scores. The results of most interest for this discussion concern the educational level of household head. It was found that "there was a positive association between education of the male head and also of the female head with median index score of adoption of recommended health practices. Those households with the

female head having under five years of formal schooling had a median score of 25 while those in which the female head had one or more years of college had a median adoption score of 54."

In a study by Maalouf (1965), farmers' level of education below sixth grade showed no significant advantage over no formal education. Education at sixth grade level or above showed substantial influence on farmers' decisions to adopt the recommended practice of applying improved fertilizer practices introduced through the result demonstration method. One of the major purposes of the study was to identify major factors associated with adoption as influenced by social, cultural, personal, economic and physical factors. Data were collected through personal interviews using a structured questionnaire from a sample of wheat farmers in Baalbeck and Akkar Counties, Lebanon. The sample included 162 demonstration farmers selected at random from wheat farmers in nine villages in the two counties where fertilizer result demonstrations were conducted, and from 101 control farmers selected by the same method from nine villages in the same counties where fertilizer demonstrations were not conducted. One major result was that a positive relationship, significant at the .01 level, was found between stages of adoption of recommended fertilizer practices and farmers' level of education (r=.418).

A multiple factor theory of directive factors in social action in relation to the changes taking place in a village in North India was studied by Barnabas (1960). This multiple factor theory states that several factors give a more adequate explanation than one or two of

why people behave the way they do. Barnabas explains social action to be any behavior of an individual which is influenced by or directed toward other individuals, groups or objects. He goes on to state that social change is composed of cumulative action of individuals and groups. Barnabas concluded, after the correlations between the characteristics of the population and the number of changes made were calculated, that for those in his sample, "the higher the education, the greater the number of changes."

Hochstrasser (1963) studied the problem of cultural change involving diffusion of agricultural techniques recommended by farm agencies among farmers in central Kentucky. The study was designed to make an anthropological investigation into a neighborhood with a low adoption rate of farming change. Hochstrasser utilized an expanded sociopsychological approach in which emphasis was upon the interplay between persons and "their immediate life situations." Data were collected by the use of "open-ended participant-observer and informant techniques with structured interview and questionnaire methods." The main findings of this study indicate that for the sample studied, "situational factors effected the utilization of available means through their involvement in individual decisions on farm strategies and tactics. The farmers accepted most new things in farming as being good ideas, at least in principle. They also shared a common view that modern ways are on the whole better than old fashioned ones. At the same time, however, the mean neighborhood adoption of recommended practices was still comparatively low." Hochstrasser goes on to point out

that, "this obviously is not due to folk orientations since the techniques actually in use are usually commercial and/or conventional rather than traditional methods." Two conclusions drawn from this study are that: 1) the small hill farmers run predominantly unmechanized subsistence - commercial operations in which many recommendations are impractical on both a technique and economic basis and 2) intra-neighborhood differences in usage are due primarily to variations in sociocultural phenomena involving a poverty in natural and man-made resources rather than any unwillingness to change. From the results of this study it is concluded that educational level was not a determining factor in the decision to change when overriding factors such as technology and economics play a predominant role in the lives of those in charge of change.

Brandner and Kearly (1964) hypothesized that persons who evaluate an innovation as congruent with a previous favorably evaluated practice will accept the innovation more rapidly than those who fail to make such an evaluation. (Fliegel (1965) has also reported that "farmers appear to adopt functionally related practices.") Hybrid sorghum was the technological innovation under study. The sample consisted of farm operators in Kansas which was chosen for its areas where corn was produced commercially and areas where essentially no corn had been produced commercially, thus providing "a natural control to ascertain the influence of a previous hybrid crop on rate-of-acceptance of a second hybrid crop." The instrumentation consisted of the open-ended question technique that attempted to 1) elicit the

congruence factor, 2) avoid suggesting responses to farmers, and 3) ascertain whether experience with hybrid corn had central, peripheral or no significance to those who had adopted hybrid sorghums." Sixty-eight percent of the hybrid sorghum adopters in the hybrid corn area of Kansas mentioned hybrid corn as the reason they decided to try hybrid sorghums, thus bearing out their original hypothesis. With regard to the variable of education, in the corn area where farmers could discuss and compare their experiences with hybrid corn, "the differences in education were slight between adopter and nonadopter groups... only 60.0 percent of the adopters had formal education beyond grade school, compared with 73.1 percent of the nonadopters. Thus, in an area where congruence of an innovation was a factor, the usual hypothesis about the role of formal education in adoption of innovations was not supported."

Havens (1965) conducted a study to answer the basic research question, "To what extent do subjective definitions of the situation affect the acceptance of technological change?" The situation studied was the adoption of bulk milk tanks by central Ohio dairy farmers. The sample consisted of 189 randomly chosen milk producers who were active shippers of milk to a cooperative association. Of the 189 respondents personally interviewed, 145 were farm decision-makers who had adopted the bulk milk tank. These 145 adopters represent the group that was analyzed in this study. The results "demonstrated that when individuals (in this study) define the situation as presenting no alternatives to adoption, they accept innovations regardless of other

factors." When the independent variable of education was correlated with the time of adoption of bulk milk tanks for the total sample, the result showed a non-significant correlation of .09. Thus once again we see that when other more personally significant factors are considered, the role of formal education in the adoption of innovations is not seen as a significant variable.

An interesting farm study completed by Wells and Andapia (1966) attempted to study the hypothesis that a greater proportion of those farmers who were younger and had more education than those who were older and had less education would return a mail questionnaire. Data for this study were taken from two previous studies conducted earlier at Iowa State University by rural sociologists (Bohlen, Beal & Hobbs (1959) and Bohlen, Beal & Hobbs (1960)). They had interviewed a state-wide random sample of farm operators in Iowa. Among other data collected was the year each respondent reported first using "2, 4-D" for the control of weeds on his farm. Two years later they sent a six-page mail questionnaire to this same group to obtain information on changes taking place in the use of fertilizer and other agricultural chemicals. The 279 respondents were divided into six roughly equal-sized groups, based on time of adoption. Respondents were then classified as to when they returned the questionnaire. "Statistical analysis of the proportions of the adopter groups returning questionnaires after the initial mailing...(provided) support for the hypothesis ...(that) respondents' age and education were not related to either time of return or time of adoption."

In a report of the relationship between the acceptance of certain health-practice innovations by Indian villages and certain social background characteristics of the villagers, Junghare and Roy (1963) conducted a study on the effects of India Village Service (IVS) in assisting villagers "to help themselves." Instrumentation for the study consisted of nine items relating to health practices that had been put into operation by the India Village Service. One question was asked for the nine specific health-practice innovations: "Which of the following practices do you use?" The nine health-care practices included: innoculation against smallpox, innoculation against cholera, paludrine or quinine, soak-pit, tablets for family planning, smokeless chulha, gammexane against bedbugs and lice, rat control in the house, and trench or borehold latrine. The random sample consisted of 200 of the 633 families living in 11 of the 22 villages in the Marehra area of India. The results of the research hypothesis, "Adoption of health-practice innovations is directly related to education" were rejected by a product-moment correlation computed to see if there was any relationship between adoption of health-practice innovations and education of the respondents. It was found that there was a low and statistically non-significant relationship (+0.022) between this factor and adoption of health-practice innovations. The authors concluded that "since three-quarters of the respondents were illiterate, the product-moment correlation may not be a good test (due to the skewed distribution)..."

Aspirational level of innovator. In the previous chapter, aspirational level was defined as "the desire and drive for more education, a more prestigious position, attendance at more brief and extended assemblages and subscription to more journals." This section of the review will consider studies dealing with some of these characteristics.

In a study by Beal and Rogers (1960), analysis showed that those classified as earlier adopters (i. e., innovative farmers) subscribed to more farm magazines and rural farm newspapers and listened to more radio farm shows, but they found that those classified as laggard or non-innovative farmers viewed more farm television shows than did those classified as innovators.

Beal and Bohlen (1957) also concluded that persons classified as innovative farmers subscribed to the most farm magazines, newspapers and specialized publications while those classified as non-adopters took the fewest farm papers and magazines. Non-innovators also read the fewest farm bulletins.

In a previously cited study, van den Ban (1957) studied the relationship of membership in farmers' organizations with other variables. She found that "...there is an interrelationship between farm size and farmers' education, their membership in farmers' organizations and cooperatives, and their style of living." This is seen as an indication that membership in professional organizations might have a positive effect on the innovativeness and consequently success of the farmer.

Hofstee (1953) offers a definition of a modern or innovative farmer that adds credibility to the hypothesis that aspirational level is a direct influence on the innovativeness of farmers. He states that:

> A modern (or innovative) farmer is a man who thinks differently, has another position towards life, and desires something else from that life... He is not a man who has learned modern (or innovative) farming by accident or vocational training, but he is a modern (or innovative) man (p. 25).

Hofstee's comment on the innovative farmer, that: "...(he) is a man who thinks differently, has another position towards life, and desires something else from that life..." is interpreted as an indication that the modern farmer does have a higher aspirational level concerning his vocation.

In another previously cited study, Gross (1949) reported findings concerning the distinguishing characteristics of the acceptors and non-acceptors of the McLean system of sanitation in two Iowa communities. The conclusions were that, in the two communities studied, acceptors "...1) were better educated; 2) reported higher social participation; 3) read more experiment station bulletins; 4) subscribed to more magazines and newspapers; 5) participated more fully in cooperatives; 6) had larger farms; and 7) had higher incomes than the non-acceptors. Points one, three, four and five are seen as justification for concluding that those persons classified as innovators have a higher professional aspiration than do non-innovators in this particular study.

Tully, Wilkening and Presser (1964) report on a study they carried out among a random sample of 100 dairy farmers in the Goulburn Valley

irrigation district in Northern Victoria. "The overall purpose of the study was to determine how ideas about farming are communicated and what social, economic and attitudinal factors influence change in farming practices." Their report focused upon two problems. The first problem was to test the notion that, when a problem exists, its recognition and an understanding of its causes affect the decision to adopt adequate measures. For our purposes here changes in farming practice are those that "...are a response to opportunities for improvement in farming practice provided by new knowledge, changes in economic conditions, changes in demand for farm produce, or changes in the aspirations or needs of the farmer and his family," (emphasis added). The second concern centers upon "...the problem of motivation for the adoption of changes in farming that are not necessarily the solution to a particular problem, but rather a response to opportunities to achieve certain goals by improving on a situation," (emphasis added). The authors conclude for the first problem that the analysis suggested "...that for complex problems arising from the deterioration of resources for which there are many causes and many solutions, a knowledge of the causes of the problem plays an important role in the decision to...(change farm practice)." In response to the second question, the results suggest that the goals chosen for investigation of the reasons for the adoption of farming practices were "...important to adopters but less important to non-adopters. Non-adopters see many more situational barriers to adoption than do adopters." The data also suggest that non-adopters place more value on convenience and ease rather than on increasing production and economic return. The results support

the belief that non-adopters seem to have lower aspirations than adopters. The authors conclude that "...if extension is to bring about changes on a higher proportion of farms in a farming community they should aim to change the norms, values, and aspirations of the farmers in that community."

Ramsey, Polson and Spencer (1959) tested the general hypothesis that value orientations influence the process of adoption. Of the twelve value orientations they tested, four are of direct concern to this review: achievement, belief in progress, hard work and individualism. These factors are seen as components of a more "universal" factor called aspirations. Their analysis was based upon data obtained from a ten percent probability sample of all dairy farmers in Cattaraugus County in southwestern New York State. Their data consisted of responses obtained from 188 farm operators. The instrument created for the project was a 120 item, forced-choice questionnaire which attempted to elicit the values farmers placed upon the twelve value orientations. Results of the data analysis for the four factors of interest showed that for the achievement variable "...the achievement-oriented farm operator (in this sample) would strive for profit, wages, respect, and opportunity for advancement in the work world." The relationship between belief in progress and adopting change "...was hypothesized as positive since the adoption of recommended practices is itself a socially accepted trend (see, for example, Hoffer and Stranghand (1958)). The null hypothesis of no relationship between belief in progress and the practice adoption scale...could not be rejected at the .05 level." The

relationship between hard work and the adoption scale was hypothesized by the researchers as being negative due to the belief that it would be expected to be a substitute for recommended innovative practices. However, "...the null hypothesis could not be rejected at the .05 level of significance." Individualism was not found to be related significantly with change adoption. The correlation between this independent variable and the dependent variable was found to be positive but weak ($r = .21$). (In another study on individualism, Fosen (1956) found for his sample that the non-adopters tended to be individualistic.)

Wilkening (1950) conducted a study of the acceptance of improved farm practices among 80 farm owners in a Piedmont community of North Carolina. Intensive interviews were analyzed with the technique of content analysis for the purpose of isolating and categorizing socio-psychological variables. Of the final 11 items under study, four pertain to this discussion of research on aspirational level: 1) attitudes toward the improvements made and needed in farming in the community; 2) recognition of the need for information about farm matters and attitudes toward certain agencies which disseminate that information; 3) attitudes toward formal education; and 4) attitudes toward farm organizations. (While the interpretation of these four components as parts of a definition for aspirations could possibly be open to debate, a closer inspection reveals a common element among them: the desire and drive toward advancement in the field of farming. This common element is closely allied with the definition for professional aspirations given in the previous chapter.) The results of the study, while incon-

clusive, showed that the following were helpful in understanding the acceptance and rejection of innovations in farming methods: 1) the individual's knowledge of and conception of the innovations and their effectiveness in obtaining certain results; 2) attitudes toward and contacts with the persons and agencies disseminating information about farm matters such as the agricultural agencies, farm journals, radio programs, etc.; 3) the extent of acceptance of formal education and scientific knowledge as essential for success in farming as opposed to reliance upon personal experience and folk language; and 4) levels of aspirations as reflected by standards of living, size and type of farming operations desired, and social status aspirations.

Chattopadhyay and Pareek (1967) found, from data collected by means of an interview technique from all 173 farmers in a village in North India near Delhi, that in computing simple correlations "...when the effects of the other variables are not taken into account, there are significant relationships between (the) adoption quotient and change-proneness (and) level of aspiration...at the .01 level." From this simple analysis they conclude that this "...suggests that the more a person is change-prone and has higher levels of aspiration, and the more he is liberal and scientific in attitude...it is expected that he will tend to have (a) higher adoption quotient..."

Schuman (1967) reports dissimilar findings from a study he conducted in Pakistan. "Belief in the possibility of efficacious change and control of the environment", rather than aspirations, was found to be significantly high in the cooperative villages he studied.

Personal characteristics were studied by Sill (1958) for the purpose of analyzing the factors associated with the variability among people in the acceptance of certain farm practices. Case histories were secured from 175 dairymen in a Pennsylvania county regarding the stages they passed through in adopting farm practices. "The practice adoption process was positively associated (in this study) with such personal characteristics of the individual as education, production aspirations, attitude of professionalism, ... (and) degree of exposure to interaction with farm agencies and organizations..." These personal factors are seen as in agreement with the definition for professional aspirations proposed earlier.

Summary of the Rural Sociology Literature

In summary, the rural sociology research reported treated selected variables considered important in the decision to adopt innovative ideas and practices. While it is difficult to generalize from the sample of studies reported, certain trends seem to arise from the results. They are categorized by characteristic and listed in point form below:

The sex variable:

1. A possible cause for the lack of studies dealing with the sex variable could be that in the rural sociological tradition most studies deal with an individual unit of analysis, the farmer; analysis is usually limited to the moderate to large scale farming operation. This "size" variable

appears to preclude the inclusion of females because of social and financial restraints upon women in large-scale farming.

2. Of the few studies reported here, the feeling is that the female is the "guardian of tradition" and relies upon beliefs and behaviors handed down from previous generations, i.e., the role of the female in the adoption-of-innovations process is that of non-innovator.

The educational level variable:

1. Many studies have been reported in rural sociology on the importance of education in the innovation-adoption process. Rogers and Shoemaker (1971) report 203 studies, 131 supporting and 72 not supporting the hypothesis that early adopters have more years of education than do later adopters.
2. A majority of the studies report that the people included in the research samples see education as one of the most important aspects in getting ahead in farming. It was also seen that most people viewed education as more important for their offspring in getting ahead in the future. People interviewed had a tendency to believe that educational attainment was a "do-all" for economic and personal advancement in improving their lot.

The aspirations variable:

1. The results reported on aspirations level are seen as inconclusive.
2. A major problem in generating conclusions from the research centers around the multitude of definitions given to the concept. This diversity in definition of the term tends to cause confusion and lack of a base for comparing conclusions.
3. While many of the studies reported that aspirational level was important in determining innovative behavior, others concluded that it loses its importance as a determining variable when other, more direct characteristics are taken into consideration, such as awareness of an experience in approaching problems, effectiveness in influencing agricultural results, etc.

Studies on Selected Characteristics of Innovators Conducted in Education

One basic difference between research conducted in rural sociology and that done in education concerning the adoption of innovations becomes apparent when one examines the results and conclusions drawn from such studies. While the rural sociologists attempt to identify innovative and laggard farmers, they also attempt to validate their conclusions by means of measuring such behavior. That is, the rural sociologists have not usually relied upon the testimony of the farmer to insure that the farmer under study is not just paying lip-service to

innovation to put himself in a better light with the investigator. Rural sociologists have substantiated evidence by measuring the effects recommended farm improvements have on the farmer's productivity (i.e., more bushels per acre, improved livestock, increased gross income, etc.). Unfortunately, diffusion studies in education have not advanced to the point where suitable measures have been found to test at a second stage whether educational "innovators" and "laggards" are truly so. Studies in education have generally relied upon the testimony of the sample subjects under study or those closely associated with the subjects. This lack of validation in the field of education has caused Miles (1964) to point out that even within the work done on innovations by educational researchers, there is a "...relative paucity of generalizations...of innovators."

A second difference between the two disciplines of inquiry stems from the specificity of models used. While the rural sociologists have constructed models of change (for example, the five-step adoption process postulated by the North Central Rural Sociology Sub-committee for the Study of Diffusion of Farm Practices (1955) the stages of which are: 1) awareness, 2) interest, 3) evaluation, 4) trial and 5) adoption; and the four-step model developed by Rogers and Shoemaker (1971): 1) knowledge, 2) persuasion, 3) decision and 4) confirmation, educational researchers have not taken the time to construct such models appropriate for education.

A third significant difference concerns the stages of innovativeness reported. Educational knowledge diffusion studies have usually reported the results of "innovative" and "laggard" personalities. The rural sociologists have gone one step further to produce what Beal and Rogers (1960) call adopter categories. The five categories consist of: 1) innovators, 2) early adopters, 3) early majority, 4) late majority and 5) laggards. Such a categorization scheme would perhaps enhance the methods and results of the studies done in education.

Addressing the points discussed above, an interesting study was completed by Paul (1965). His primary purpose was to explore the relationship between several social, psychological and motivational variables and innovation. Of particular interest is the fact that Paul took into consideration the first difference mentioned above; an attempt was made to measure a person's innovativeness by his "good works." Only one innovation, the Ericphone, was used as a dependent variable. As Gulesian (1970) points out: "...(Paul) does exemplify a procedure often missing in education studies; namely, there...(was) an attempt to make a concrete determination regarding the problem of who is an innovator and who is not." The 82 subjects he used were divided evenly into two groups on the basis of their adoption or non-adoption of the Ericphone. Data were collected by means of an interview technique on the variables of age, education, socioeconomic status, source of original information about the phone, perceived innovativeness, group membership, leadership, aspirational level, achievement orientation, self-concept, etc. Paul concludes that "the data suggested that the

person classified as an innovator can be described as a sociometric isolate with a higher aspirational level than the person classified as a non-innovator; the innovator might be younger in age and have less education than the non-innovator."

Wygal (1966) conducted a study using the Rogers model to "determine the personal characteristics of junior college instructors as related to innovativeness." He used a sample of 52 junior college instructors, rated as either innovative or traditional by their deans. His results showed that the innovators in his study tended to be younger than traditionalists but six other hypotheses were not supported by the data: 1) men are more innovative than women, 2) innovators possess more formal education than traditionalists, 3) innovators possess broader experience backgrounds than traditionalists, 4) instructors' teaching fields are related to their innovativeness, 5) innovators have been present in their teaching positions for shorter periods of time than traditionalists, and 6) innovators are more cosmopolite than traditionalists.

An earlier study by Leas (1962) compared the personal and professional characteristics of a sample of innovative and traditional secondary school teachers in Indiana. His instrumentation included: the Personal Data Questionnaire, the Conservative-Liberal Scale, the Flexibility Scale and the Innovative Scale. He concluded that in his sample: 1) there was no significant difference between the socio-economic backgrounds of those classified as innovators and those classified as traditionalists; 2) the innovators tended to be younger

than the traditionalists; 3) the traditionalists were found to have a greater number of years teaching experience than innovators; 4) there were no significant differences found regarding the sex of traditionalists and innovators; 5) innovators reported traveling more extensively than traditionalists; 6) there were no significant differences in the income of traditionalists and innovators; 7) innovators perceived themselves as leaders more frequently than did traditionalists; 8) innovators were more concerned with clarifying the aims of education than were traditionalists; 9) the innovators scored a significantly higher mean score on the Flexibility Scale than did the traditionalists; 10) the innovators scored a significantly higher mean score on the Innovative Scale than did the traditionalist and 11) innovators were significantly less conservative than traditionalists.

Jenkins (1967) among other things attempted to determine whether creativity was a measure of innovativeness. Using a sociometric technique, he asked teachers and administrators from two high schools to rate one another according to nine characteristics relating to innovativeness. The 15 who were rated highest and the 15 who were rated lowest on this scale were then compared on the following criteria: 1) scores on the National Teachers Examination; 2) undergraduate quality point average, overall; 3) undergraduate quality point average, teaching field; 4) total number of college credits and 5) total years of teaching experience. Four additional instruments were used to identify creativity: the Sixteen Factor Personality Questionnaire, the Edwards Personal Preference Schedule, The Guilford Battery and the Tennessee

Department of Mental Hygiene Self Concept Scale. Jenkins concluded the following for his study sample as a result of his data analysis:

1. Innovative teachers were more original and displayed more ideational fluency, as well as a more thorough grounding in a diverse selection of academic disciplines.

2. Innovative teachers tended to be more dominant, adventurous, disorderly, radical, more self-confident, more flexible, and more complex.

3. Neither undergraduate grades nor the total number of years teaching seemed to discriminate significantly between innovative and non-innovative teachers.

Henderson (1968) supported Jenkins (1967) findings, regarding the conclusion that those classified as innovators were aggressive, radical and independent, with a study on the characteristics of school administrators. His findings conclude that those persons classified as innovative administrators in his sample were younger, had had more jobs and had travelled outside their state more than had the administrators he identified to be traditional. His conclusion concerning the total number of jobs that the innovative administrators in his sample had occupied can be interpreted either as an indication that 1) innovative personnel possess a higher level of professional aspirations which manifests itself in the form of frequent job changes in an upward direction or 2) due to their innovative behavior, they are forced to find new employment positions which allow such behavior.

In an interesting study completed in the area of physical education, Loy (1967) studied an "aspect of technological change in competitive swimming by determining the degree and nature of the relationship

between certain personal attributes of British coaches and their date of adoption..." of an innovative method of swimming instruction. Loy hypothesized that the adoption of this innovative method of instruction would be positively related to: 1) educational status, 2) occupational status, 3) professional status, 4) peer status, 5) cosmopoliteness, 6) venturesomeness, 7) experimentiveness, 8) intelligence, 9) dominance, 10) perseverance, 11) self-sufficiency and 12) creativity. Instrumentation included two questionnaires developed by the investigator and Cattell's Sixteen Factor Personality Questionnaire. The sample consisted of 35 personally interviewed subjects plus 71 additional subjects to whom the questionnaires were mailed. Loy concluded that on the basis of the findings of his investigation the differential adoption of the innovative methods of swimming instruction by his sample members was related to "...educational status, occupational status, professional status, peer status, cosmopoliteness, venturesomeness, imaginativeness, shrewdness, experimentiveness, dominance, perseverance, intelligence, sensitivity, creativity and self-sufficiency."

Summary of the Educational Literature

In summary, from the literature reviewed in the field of educational innovation, we can conclude the following:

1. Studies in educational innovation-adoption do not usually use a two-state test of innovativeness (i.e., investigation, validation).

2. Studies concerning educational innovations do not usually rely upon models of change such as those used by rural sociologists (e.g., awareness, interest, evaluation, trial, and adoption).
3. Studies in educational innovations do not usually rely upon adopter categories such as those used by rural sociologists (e.g., innovators, early adopters, early majority, late majority and laggards).
4. The educational studies reported have concluded that there do not appear to be significant differences between the sexes concerning innovative activity.
5. There appears to be almost general consensus that those classified as innovative educators are younger than those classified as laggard educators.
6. Those classified as innovative educators also appear to have higher aspirational levels.
7. The studies conclude that there does not appear to be any significant difference in socio-economic background between the two groups.
8. Nor does there appear to be any difference in the number of years teaching experience.
9. The innovator educator in those studies reported does appear to have travelled more.
10. Also, he appears to have held a greater number of jobs than those classified as laggard educators.

11. Finally, the results are inconclusive concerning whether those persons identified as innovative educators have had more years of formal education than those identified as laggard educators.

Conclusions Based Upon the Literature

From the foregoing review of literature and research it is concluded that a lack of adequate generalizations are available concerning the three variables presently under study. Some of the major difficulties include:

1. A lack of generalizable studies dealing with the sex variable.
2. Inconclusive results of studies concerning the level of education of innovative and laggard educators.
3. Inconclusive results on the variable, professional aspirations, due to lack of operationalism in the definitions of the construct.

The present study is seen as an attempt to provide additional research data for the variables under study. The analysis of data dealing with the sex variable will add to the small number of studies conducted on the variable. Educational level of innovative and laggard educators will be examined from different perspectives thus allowing a detailed analysis from which conclusions can hopefully be drawn. Lastly, given the specificity of the present definition of professional aspirations, we will hopefully be able to conclude and interpret results in a manner that is meaningful to the educational community.

CHAPTER III

CHAPTER III

PROCEDURES AND METHODOLOGY

This chapter contains a description of the relevant procedures and methodology employed in the study. Included in this chapter will be a description of the purposes of this dissertation; a more detailed look at the Kettering Study of Knowledge Diffusion and Utilization emphasizing the hypotheses studied and the results and conclusions reached; a description of the thesis procedures of this dissertation including specific hypotheses, population, instrumentation, data collection and analysis; and the limitations to data interpretation.

Purpose of the Study

The general purposes of this study are to explore the following questions concerning innovation in an educational knowledge diffusion context: Are a greater number of males identified as innovative educators than females? Are a greater number of males identified as laggard educators than females? Is the arithmetic average of the number of years of education of those identified as innovative educators greater than the arithmetic average of the number of years of education of those identified as laggard educators? Do those identified as innovative educators demonstrate a higher level of professional aspirations than those identified as laggard educators?

From answers to the above questions, it is hoped that more knowledge on the variables of sex, training and aspirations will be

learned as a result of the present study. In addition, two supplementary purposes are to further analyze the findings for training and aspirations by dividing on the sex variable of the educator.

In summary, the data analyses will include results for the following characteristics of the subject sample:

1. Determination of the number of male and female persons classified as innovative educators.
2. Determination of the number of male and female persons classified as laggard educators.
3. Determination of the distribution of persons classified as innovative and laggard educators by educational level.
4. Determination of the average number of years of education of persons classified as innovative and laggard educators.
5. Determination of the distribution of persons classified as innovative and laggard educators into high, medium and low professional aspirations.
6. Determination of the distribution of persons classified as innovative and laggard educators by sex and educational level.
7. Determination of the distribution of persons classified as innovative and laggard educators by sex and high, medium and low professional aspirations level.

The research design strategy for the independent and dependent variables is represented graphically in Table 3.1.

TABLE 3.1

Research Design Strategy
for Independent and Dependent Variables
in the Study*

TOTAL YEARS OF EDUCATION	Type of Educator											
	INNOVATIVE						LAGGARD					
	Male			Female			Male			Female		
	Aspirational Level			Aspirational Level			Aspirational Level			Aspirational Level		
	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
12												
13, 14, 15												
16												
16.5												
17												
18												
19												

*Type of educator (innovative, laggard) constitutes the dependent variable while sex, educational level and professional aspirations are the independent variables.

The Kettering Study of Knowledge Diffusion and Utilization

In Chapter I a description was given for the purposes, population, instrumentation and data analysis techniques used in the Kettering Study. The present focus is upon the specific intentions tested and the conclusions reached in that study.

The following intentions and conclusions were reached by Wolf and Fiorino (1972):

1. Intention: To study the extent to which subjects engaged in innovative activity.

   Conclusion: At least one innovation was adopted by 70% of the subjects; at least two by 24%; and at least three by 7%. At least one innovation was earmarked for adoption by 46% of the subjects; at least two by 8%; and at least three by 1%. At least one innovation was mentioned but not adopted by 63% of the subjects; at least two by 18%; and at least three by 4%. Hence, the sample was immersed in innovative activity. Sufficient work was reported to permit an intensive study of the innovation adoption process, given the researchers' concerns about knowledge diffusion and utilization.

2. Intention: To study the influences of recognized diffusion agents upon the adoption of innovations to subjects' personal practice.

   Conclusion: Since nine in ten subjects interviewed failed to relate in any way specific innovations discussed to diffusion strategies of interest to the study (even though their exposure to these diffusion strategies accounted for subject inclusion in the study), it is not unreasonable to believe selected diffusion strategies aren't exerting much influence upon the adoption of innovations to subjects' personal practice. Most of the diffusion agents are purveying practices, products, and ideas worthy of adoption; yet, adoption behavior certainly isn't related to their purveying effort. Perhaps the diffusion strategies need to be reexamined in light of data reported.

3. Intention: To study characteristics of selected target audiences in relation to the adoption of innovations to personal practice.

Conclusion: Insofar as level of experience, years of experience, and earned academic credit are concerned, there were no stark variations in practice. Specific exceptions have been previously noted. Most of the subjects interviewed were experienced, well-educated, and representative of one of three kinds of roles. Since demographic characteristics of the sample couldn't be predetermined, these analyses weren't particularly fruitful.

4. Intention: To study characteristics of selected diffusion strategies in relation to the adoption of innovations to personal practices.

Conclusion: Insofar as style, duration, and audience size of the diffusion strategies are concerned, there were several practices worthy of comment. Personal, direct involvement type diffusion strategies seemed to foster innovative activity more than other styles. Uncontrolled sources and sources calling for less than one week's involvement related to subjects' continuing interest in innovations. Whereas, most subjects rarely mentioned large group participation (N=50 or more participants) in relation to innovative activity.

Agencies interested in the diffusion of educational innovations need to consider factors such as personal involvement, small group experiences, and follow-up when they plan professional programs. Purposes set forth for large group regional and annual meetings need to be reconsidered. So do purposes for periodicals and other widely distributed publications.

5. Intention: To study relationships between five stages of innovation adoption described by rural sociologists and the adoption process described by randomly selected educators.

Conclusion: Educators adhere to a three stage rather than a five stage model. These stages include: (1) awareness and continuing interest, (2) evaluation, and (3) adoption.

> Educators do not rely upon either a trial stage or scientifically gathered information in the process of innovation adoption.
>
> Educators seem to be "turned on" by an innovation for practical reasons and then follow it through to the bloody end, called adoption, with little variation. Once adopted, innovations become a fixture within the educator's practice.
>
> More rational and more deliberate behavior were anticipated by the researchers. These data reveal rather vividly the absence of disciplined inquiry as part of the educators' innovation adoption behavior. Much work needs to be done before the process of educational knowledge diffusion exerts a continuing influence upon educational knowledge utilization (pp. 85-87).

Thesis Procedures

This study will analyze data pertinent to four null hypotheses:

1. There is no significant difference between the number of males and females identified as innovative educators.
2. There is no significant difference between the number of males and females identified as non-innovative educators.
3. There is no significant difference between the arithmetic average of the number of years of education of persons identified as innovative and non-innovative educators.
4. There is no significant difference between the professional aspirations of persons identified as innovative and non-innovative educators.

In addition to the four research hypotheses stated above, additional supplementary analyses will be conducted upon the third and fourth hypotheses. Training and aspirational level will be further dichotomized by sex to analyze 1) educational level by type and sex of educator and 2) professional aspirations by type and sex of educator.

By determining whether the above hypotheses can be rejected, conclusions may be drawn to test the compatibility of the following rural sociology theories to the field of education:

1. Earlier adopters (or innovators) have more years of education than do later adopters (or non-innovators).
2. Earlier adopters (or innovators) have higher aspirations (for education, occupations, and so on) than later adopters (or non-innovators).

There does not appear to be any suitable theories in rural sociology concerning the sex of early and late adopters.

Study Population

The data for this study are part of that generated by the Kettering Study of Educational Knowledge Diffusion and Utilization (described in Chapter I). The present investigation concerns itself with 200 educators drawn from the original study: the 100 persons classified as most innovative and the 100 persons classified as least innovative. The present sample of 200 was determined by means of a weighting system employed by Wolf and Fiorino (1972), "A subject 'earned' nine points

for each innovation adopted, four points for each innovation about to be adopted, and one point for each innovation attempted but not adopted." The weights assigned were arbitrarily chosen by the researchers.

The determination of whether the original sample subjects adopted, were about to adopt or attempted but failed to adopt innovations was based upon their responses to certain items on the interview inventory (see Appendix A). These questions were:

1. Please identify any new practices, products and ideas that you initiated, introduced and have adopted in your work during the past year.
2. Please identify any new practices, products and ideas that you initiated and definitely plan to adopt in your work within the next year.
3. Please identify any new practices, products and ideas that you would like to adopt in your work that for some reason you are prevented from doing.

An individual's "innovativeness score" was computed by adding up the total amount of credits earned through innovative activity. A computer program was prepared by the University of Massachusetts Computer Center to tabulate each individual's "innovativeness score" and rank order each subject according to this score. The present investigation relies upon the data of those 100 ranked as most innovative and those 100 ranked as least innovative from the original study.

Instrumentation

The two major instruments to be utilized in this study are the interview inventory created for the original study and a worksheet devised by the author to monitor the sex and training variables along with computing professional aspirations indices. The former instrument was initially designed in the summer of 1966. The final version (see Appendix A) evolved from three pilot trials and two major revisions. Its main purposes were to determine 1) what ideas and practices were new to the interviewee; 2) what antecedents and causal events were influential in the mind of the interviewee on his adoption of new ideas and practices; and 3) descriptive data about the interviewee, and about influential diffusion agents. The latter instrument, The Worksheet for Tabulating Sex and Educational Level and for Computing Professional Aspirations Level, was devised by the author to help monitor and compute relevant data. The data entered into this worksheet will consist of: sex, number of years of formal education, occupational level, number of brief and extended assemblages attended, and number of professional journals to which the person subscribes.

As was the case with computing a score for innovativeness in the original Kettering Study, the professional aspirations index will rely upon a weighting scheme. A subject will be credited with a number of points (depending upon certain conditions) for the level of his present occupation, the amount of schooling completed, the number of professional journals to which he subscribes and the number of brief and extended assemblages attended. The weights have been arbitrarily

chosen. Table 3.2 represents an illustration of this worksheet. Table 3.3 is an explanation of the various items that are part of the worksheet along with the number of points to be entered for each category.

Data Collection

The data for this study were drawn from the responses of sample subjects to questions from the original interview instrument (see Appendix A). These responses were transferred to the Worksheet for Tabulating Sex and Educational Level and for Computing Professional Aspirations Level. Thus the original data plus arbitrary weights assigned to the relevant data items are integrated into the Worksheet. For the purpose of clarity, they will be explained in the order in which they appear.

"Identification number" is a label assigned to each sample subject. Its purposes are to 1) easily identify any member of the sample, and 2) act as a monitor against the exclusion of any subject in the data analysis. Identification numbers will range from one to 200; thus the person identified as most innovative will be identified as Number One and the person identified as least innovative in the sample will be known as Number Two Hundred.

"Innovation Index" is the score computed by Wolf and Fiorino (1972) to determine rank of innovativeness of the 595 usable subjects included in the original study. Its use in the present analysis will be to identify the 100 most and 100 least innovative subjects.

TABLE 3.2

Worksheet for Tabulating Sex and Educational Level and for Computing Professional Aspirations Level

I. D. Number	Innovation Index	Innovative Educator?	Sex	Weight for Title of Position	Years of Academic Experience	Weight for Academic Experience	Weight for No. of Publications	Weight for No. of Free Publications	Total Weight for Publications	Weight for No. of Brief Assemblages	Weight for No. of Free Brief Assemblages	Total Weight for Brief Assemblages	Weight for No. of Extended Assemblages	Weight for No. of Free Extended Assemblages	Total Weight for Extended Assemblages	Cumulative Professional Aspirations Index

TABLE 3.3

Key to Worksheet for Tabulating Sex and Educational Level and for Computing Professional Aspirations Level

ITEM	EXPLANATION	Code Categories
1. I. D. Number	The number identifying each person in the sample of this study.	N. A.
2. Innovation Index	The index computed by Wolf and Fiorino (1972) to determine rank of innovativeness of the 595 persons included in the original study. The range of this innovation index is from "1" to "595."	N. A.
3. Innovative Educator?	A check mark is placed in this column if the person is one of the 100 innovative educators included in this study.	N. A.
4. Sex	For codification purposes, a "1" will be placed in this column for males; a "2" entered for females.	N. A.
5. Weight for Title of Position	The following weights were assigned to the various positions that sample subjects were engaged in: Elementary or secondary teacher Superintendent or administrator Teacher educator Other*	 1 2 3 N. A.

*Due to the difficulty of assigning retired persons or students weights for this question (that is, determining past or future positions), they were eliminated from consideration for this part of the study.

TABLE 3.3 Cont'd.

6. Years of Academic Experience	This item reports the total number of years of formal education that the sample subject has obtained to date: 12 = high school graduate 13, 14, 15 = some college 16 = college graduate ** 16.5 = master's student ** 17 = master's degree holder ** 18 = doctoral student ** 19 = doctoral degree holder	 12 13, 14, 15 16 16.5 17 18 19
7. Weight for Academic Experience	The following weights were assigned to the various levels of academic experience that sample subjects obtained: 1 = high school graduate 2 = one year of college 3 = two years of college 4 = three years of college 5 = college graduate 6 = master's student 7 = master's degree holder 8 = doctoral student 9 = doctoral degree holder	 1 2 3 4 5 6 7 8 9
8. Weight for Number of Publications	The sample subject is given one point for each publication that is relied upon for information.	1

**For the author's purposes, an arbitrary assumption was that 16.5 was the best estimate of a master's student; 17 or one year past the bachelor's degree was the best estimate of a master's degree holder; 18 or two years past the bachelor's degree was the best estimate of a doctoral student; and 19, or three years past the bachelor's degree was the best estimate of a doctorate in education.

TABLE 3.3 Cont'd.

9. Weight for Number of Free Publications	For each publication the sample subject mentions that is received free a minus one (-1) is noted and the total number of free publications is recorded.	-1
10. Total Weight for Publications	Weight for Number of Free Publications is subtracted from Weight for Number of Publications to compute this score.	
11. Weight for Number of Brief Assemblages	The sample subject is given two points for each brief assemblage that is regularly attended for information.	2
12. Weight for Number of Free Assemblages	For each brief assemblage the sample subject mentions that is received free, that is, expenses are paid in full or part, a minus two (-2) is noted and the total number of free brief assemblages is recorded. (A minus two (-2) was chosen to counterbalance the effect of two points given for each attendance.)	-2
13. Total Weight for Brief Assemblages	Weight for Number of Free Brief Assemblages is subtracted from Weight for Number of Brief Assemblages to compute this score.	
14. Weight for Number of Extended Assemblages	The sample subject is given three points for each extended assemblage that is attended for information.	3

TABLE 3.3 Cont'd.

15. Weight for Number of Free Extended Assemblages	For each extended assemblage the sample subject mentions that is received free, that is, expenses are paid in full or part, a minus three (-3) is noted and the total number of free extended assemblages is recorded. (A minus three (-3) was chosen to counterbalance the effect of three points given for each attendance.)	-3
16. Total Weight for Extended Assemblages	Weight for Number of Free Extended Assemblages is subtracted from Weight for Number of Extended Assemblages to compute this score.	
17. Cumulative Professional Aspirations Index	This score is computed by adding or subtracting the weights for Items 5 and 7 through 16 above. This index represents the extent to which an educator has professional aspirations as defined in this study; that is, the higher the score, the more an individual is considered to possess professional aspirations.	

"Innovative Educator?" is simply a determination of whether a particular subject is in the innovative half of the present sample. A check mark will be placed in this column if the subject is one of the 100 innovative educators included in this study.

"Sex" will be determined by examining the original interview document. Gender will be ascertained from the Interviewee's name written at the top of this original document. If for some reason it cannot be determined whether the interviewee is male or female, the tape recording for the original interview will be examined. For codification purposes, a "1" will be placed in this column on the worksheet for males; a "2" entered for females.

"Weight for Title of Position" was arbitrarily assigned by the author. Title of position was taken from the original interview document and the following weights were assigned to the various positions that sample subjects were engaged in: 1) Elementary and secondary teachers were assigned a "1"; 2) Superintendents and administrators were assigned a "2"; and 3) Teacher educators were assigned a "3". Due to the difficulty of assigning retired persons and students weights for positions they do not at the present time hold, such subjects were eliminated from consideration for determination of professional aspirations.

"Years of Academic Experience" reports the total number of years of formal education that the sample subject has attained to date. "Academic Experience" was the question on the original document from

which information was gathered. Weights were assigned to the years of educational training as follows: 1) A high school graduate received 12 points; 2) Subjects who completed one, two or three years of post-secondary education received 13, 14 or 15 points, respectively; 3) A college graduate received 16 points; 4) A subject who completed some work toward the master's degree received 16.5 points; 5) A master's degree holder was credited with 17 points; 6) A doctoral student received 18 points; and 7) A doctoral degree holder received 19 points. For the author's purposes, an arbitrary assumption was that 16.5 years of education was the best estimate of a master's student; 17 (or one year past the bachelor's degree) was the best estimate of a master's degree holder, 18 (or two years past the bachelor's degree) was the best estimate of a doctoral student; and 19 (or three years past the bachelor's degree) was the best estimate of a doctorate in education.

"Weight for Academic Experience" was arbitrarily chosen by the author. The following weights were assigned to the various levels of academic experience that sample subjects obtained:

1 = High school graduate

2 = One year of college completed

3 = Two years of college completed

4 = Three years of college completed

5 = College graduate

6 = Master's student

7 = Master's degree holder

8 = Doctoral student

9 = Doctoral degree holder

"Weight for Number of Publications" is concerned with the response to the question, "Which particular publications or sections of publications do you rely upon for information?" on the original interview instrument. The sample subject is given one (1) point for each publication that is mentioned.

"Weight for Number of Free Publications" is determined by the response of the subject to the original question, "What part do you pay for each of these publications?" For each publication the sample subject mentions that is received free a minus one (-1) is noted and the total number of free publications is recorded.

"Total Weight for Publications" is a computed score. "Weight for Number of Free Publications" is subtracted from "Weight for Number of Publications" to compute this score.

"Weight for Number of Brief Assemblages" is determined from the response to the original question, "Which particular (brief) assemblages do you regularly attend for information?" The sample subject is given two (2) points for each brief assemblage that is attended for information.

"Weight for Number of Free Brief Assemblages" is determined by the response of the subject to the original question, "What part do you pay for each of these (brief assemblages)?" For each brief assem-

blage the sample subject mentioned that is received free, that is, expenses are paid in full or part, a minus two (-2) is noted, and the total number of free brief assemblages is recorded. A minus two (-2) was chosen to counterbalance the effect of two points given for each attendance.

"Total Weight for Brief Assemblages" is computed by subtracting "Weight for Number of Free Brief Assemblages" from "Weight for Number of Brief Assemblages."

"Weight for Number of Extended Assemblages" is determined from the response to the original question, "Which particular (extended) assemblages do you attend for information?" The sample subject is given three (3) points for each extended assemblages that is attended for information.

"Weight for Number of Free Extended Assemblages" is determined by the response of the subject to the original question, "What part do you pay for each of these (extended assemblages)?" For each extended assemblage the sample subject mentions that is received free, that is, expenses are paid in full or part, a minus three (-3) is noted and the total number of free extended assemblages is recorded. A minus three (-3) was chosen to counterbalance the effect of three points given for each attendance.

"Total Weight for Extended Assemblages" is computed by subtracting "Weight for Number of Free Extended Assemblages" from "Weight for Number of Extended Ass emblages."

"Cumulative Professional Aspirations Index" is computed by adding the weights for the following: "Weight for Title of Position", "Weight for Academic Experience", "Total Weight for Publications", "Total Weight for Brief Assemblages" and "Total Weight for Extended Assemblages." This index represents the extent to which an educator has professional aspirations as defined in this study. The higher the aspirations index, the more an individual is considered to possess professional aspirations, and conversely, the lower the score, the more an individual is considered not to possess professional aspirations.

Data Analysis

The analysis of the data will include the following:

1. A tabulation of the number of persons identified as innovative and laggard educators by sex;
2. A tabulation of the number of persons identified as innovative and laggard educators by the number of years of schooling;
3. The computation of the average number of years of education of persons identified as innovative and laggard educators, including the mean and the standard deviation;
4. A supplementary analysis of educational level of persons identified as innovative and laggard educators by sex;
5. A tabulation of persons identified as innovative and laggard educators by professional aspirations, utilizing the Worksheet for Tabulating Sex and Educational Level and for Computing Professional Aspirations Level outlined above. (The scores

for professional aspirations will be arbitrarily divided into three categories: High, Medium, and Low);

6. A supplementary analysis of professional aspirations of persons identified as innovative and laggard educators by sex; and, finally,
7. Tests of significance will be included where it is deemed appropriate to determine the probability of whether the results occurring could be on the basis of chance alone.

More specifically, the analysis of Hypothesis One, that there is no significant difference between the number of males and females identified as innovative educators, will include a breakdown of the one hundred sample subjects by sex. Totals will be calculated for type of educator and for sex. A chi-square test of significance will be computed to determine the independence or association of the two variables: sex and type of educator.

Likewise, Hypothesis Two, that there is no significant difference between the number of males and females identified as non-innovative educators, will be investigated using similar tables and procedures. Additionally, a binomial probability distribution will be constructed to test Hypothesis One and Two concerning the significance of the probability of the number of women included in each group.

The third hypothesis, that there is no significant difference between the arithmetic average of the number of years of education of those identified as innovative and non-innovative educators, will be

analyzed by categorizing the 200 subjects by years of education completed and by type of educator. The means and standard deviations of the two groups will then be computed. To test the hypothesis, a t test will be utilized to test for the significant difference between the two means.

The fourth hypothesis, that there is no significant difference between the professional aspirations of those identified as innovative and non-innovative educators, will be tested in much the same manner as Hypotheses One and Two. First, a professional aspirations index will be computed for each of the 200 sample subjects. (The procedures for procuring this index were outlined in the previous section.) The second step will consist of dividing the subjects by the type of educator variable and by high, medium, and low professional aspirations. (The determination of the three aspirations categories will be arbitrarily chosen by the author; the range of professional aspirations index will be divided by three and the Low category will consist of those subjects whose scores are in the lowest third of the range, the Medium category will be those whose scores consist of the middle third scores, and lastly, the High category will be made up of the highest third scoring individuals.) A chi-square test of significance will be computed to determine the independence or association of the two variables: professional aspirations and type of educator.

The supplementary analyses performed on the data will conform much the same to that already mentioned here. The first additional analysis will be performed on the education variable. Educational level

will be further dichotomized by sex,thus allowing us to examine educational level by type and sex of educator. This information will be further analyzed by calculating the mean and standard deviation of the average number of years of education of those identified as male and female innovative and laggard educators. To identify whether the means are significantly different from one another, t tests will be calculated for the means of 1) male innovative and laggard educators, 2) female innovative and laggard educator, 3) male and female innovative educators, and 4) male and female laggard educators.

The second additional analysis will be performed on the professional aspirations variable. Professional aspirations will be further dichotomized by sex allowing us to examine professional aspirations level by type and sex of educator. A chi-square test of significance will be performed to determine the independence or association between the various part of the aspirations and sex variables.

Limitations to Data Interpretation

There are five limitations to the study which will tend to limit the extent to which generalizations may be drawn. Three of these limitations were inherent in the Kettering Study; the fourth and fifth are outgrowths of that study.

The first limitation in the Kettering data was caused by the fact that the researchers were not given free access to all lists of potential sample subjects by the diffusion agencies contacted, but instead re-

ceived "randomized" lists prepared by the diffusion agents themselves. The researchers could only assume that their request for randomness was honored.

Due to budget limitations, the Kettering researchers sometimes excluded geographically isolated persons from the sample. This would tend to bias the sample in favor of people living in or near urban centers.

Data gathered for the Kettering Study was solely the product of an interview technique. Data sometimes gathered in this manner tend to be opinion and attitude oriented. Although the data gathering was completed during direct, face-to-face interviews with trained interviewers on hand, no means were utilized to validate the data obtained.

The fourth limitation is more of an outgrowth of the original study. The present procedures rely upon the original data of the study; Herbert Lionberger would call this an "after-the-fact" study. While this may be viewed by some as a negative factor and lead them to assume a multitude of minor limitations, it should be understood that at the time of the original study not all research questions were posed. Extended analyses of data are well-known in the educational research literature. A case in point is the Coleman Report (1966). It was originally commissioned by the Congress of the United States for decision-making purposes. Much conclusion-oriented study of the data has occurred since the original report appeared in the literature (see, for example, Mosteller & Moynihan (1972)).

A fifth and final limitation of the present study is that routinely, "many members of the educational community were not exposed to the diffusion agents mentioned here." Consequently, the opportunity for their being selected did not exist. Therefore, the conclusions reached in the present study must be considered in terms of educators who were exposed to the diffusion agents included in the Kettering Study.

CHAPTER IV

CHAPTER IV

DATA ANALYSIS

The data analyzed in this chapter conform to the specifications outlined in Chapter III. There were no gross discrepancies between the planned data collection strategy and that actually employed. The original sample size (200) proposed in Chapter II was adhered to for Hypotheses One, Two and Three, those dealing with the sex and academic training variables. For the professional aspirations variable, Hypothesis Four, certain interview schedules contained one of two problems: 1) information concerning publications and brief and extended assemblages was incomplete or non-existant; or 2) certain subjects could not be categorized as to employment position (i.e., retirees and students). To summarize, due to the incompleteness of 12 interviews and the difficulty of assigning weights to Title of Position for 20 retirees and students, the original sample was decreased to 168 for this part of the analysis. The 12 incomplete interviews consisted of nine innovative and three non-innovative educators, while the non-assignable interviews consisted of one innovative and 19 non-innovative educators. The reduction of the sample size to 168 interviews was not seen as a threat to statistical analysis. In all cases, cell size was adequate for computation purposes.

The remainder of this chapter is divided into two sections: 1) the analysis of the four research hypotheses under study; and 2) the analysis of the supplementary data pertinent to the original questions under study.

Analyses of the Research Hypotheses

Hypothesis One was stated as follows:

1. There is no significant difference between the number of males and females identified as innovative educators.

Table 4.1 shows the distribution of those classified as innovative and laggard by sex. Given the 100 subjects included in this part of the study, we note that 54 subjects were male and 46 were female.[1] Checking the significance of this outcome we observe in Table 4.2 that the expected frequency in this situation would be 44 males and 56 females.

In a similar manner, Hypothesis Two was tested that:

2. There is no significant difference between the number of males and females identified as non-innovative educators.

We observe in Table 4.1 that 34 males and 66 females were identified in our sample of 100 as laggard (or non-innovative) educators. The expected frequencies in such a situation are noted in Table 4.2; it would be expected that 44 males and 56 females would be identified as non-innovators.

Table 4.3 is a calculation of chi-square for data contained in Table 4.2, showing the relationship between sex and type of educator. The question of concern is whether there is a significant difference in the innovativeness of males and females. A calculated chi-square value of 8.12 proved to be significant at the .01 level. We may assume

[1]Although it was stated that the sample size was 200, it must be kept in mind that for this hypothesis we are dealing with only one half of the sample.

TABLE 4.1

Distribution of Innovative and Laggard Educators by Sex

Sex	Type of Educator		Totals
	Innovative	Laggard	
Male	54	34	88
Female	46	66	112
Totals	100	100	200

TABLE 4.2

Contingency Table Showing Relationship Between Observed and Expected Frequencies for Male and Female Innovative and Laggard Educators[2]

Sex	Type of Educator		Totals
	Innovative	Laggard	
Male	54 (44)	34 (44)	88
Female	46 (56)	66 (56)	112
Totals	100	100	200

[2] Expected frequencies shown in parentheses based on the marginals.

TABLE 4.3

Calculation of X^2 for Data in Table 4.2[3]

Observed Frequency	Expected Frequency	$\frac{(\text{Observed-Expected})^2}{\text{Expected}}$
54	44	2.27
34	44	2.27
46	56	1.79
66	56	1.79
Totals		$X^2 = 8.12$*

[3] d.f. = 1

* $p < .01$

that the innovative and non-innovative groups differed on the sex variable.

To further test the significance of Hypothesis One and Two, a binomial probability distribution was constructed. The values of p and q, proportion of females and males, were .524 and .476, respectively. These proportions were calculated from the number of females and males included in the population under study: 312 females and 283 males. The binomial probability distribution mean equalled 52.4 and had a standard deviation of 4.99. Table 4.4 represents the relevant excerpt from the binomial probability distribution in question.

With regard to Hypothesis One, we enter the binomial probability distribution for 46 (the number of women identified as innovative educators) and find a probability of this being this or more extreme of .118. Using a significance level of .01, Hypothesis One cannot be rejected. There does not appear to be a significant, non-chance difference between the number of males and females identified as innovative educators.

In a similar manner for Hypothesis Two, the number of women identified as non-innovative educators was 66. The probability of this being as extreme or more by chance is .003 (1.000-.997). With a significance level of .01 we may reject Hypothesis Two. There does appear to be a significant, non-chance difference between the number of males and females identified as non-innovative educators with a greater number of females represented in this category.

TABLE 4.4

Excerpt From Binomial Probability Distribution:
Number of Females in a Sample of 100
From a Population With P = .524

Number of Females in a Sample of 100	Discrete Probability	Cumulative Probability
46	.03517	.11878
47	.04448	.16326
48	.05406	.21732
49	.06316	.28048
50	.07092	.35140
51	.07654	.42794
52	.07940	.50734
53	.07916	.58650
54	.07584	.66234
55	.06983	.73217
56	.06177	.79394
57	.05249	.84644
58	.04284	.88928
59	.03357	.92285
60	.02525	.94811
61	.01823	.96634
62	.01262	.97896
63	.00838	.98734
64	.00533	.99268
65	.00325	.99593
66	.00190	.99783

Moving on to Hypothesis Three, which was stated that:

3. There is no significant difference between the arithmetic average of the number of years of education of persons identified as innovative and non-innovative educators,

we see in Table 4.5 the distribution of persons identified as innovative and laggard educators by educational level. Table 4.6 represents the calculations of the means and standard deviations for the two groups in question. To test the strength of Hypothesis Three, a test of the significance of the difference between the means for years of education of innovative and laggard educators was computed. Given that a computed F test showed the homogeneity of variance assumption not to be tenable and the fact that the sample sizes of the two groups were equal, a separate variance formula with n - 1 degrees of freedom was used. Table 4.7 represents the results of this computation. Hypothesis Three could not be rejected at the 0.01 level but was rejected at the 0.05 level of significance. With 95 percent confidence we can assume that the means for Years of Education are significantly different, with innovative educators leading by .26 years of education.

Hypothesis Four was stated that:

4. There is no significant difference between the professional aspirations level of persons identified as innovative and non-innovative educators.

For this part of the analysis, we find that our subject sample was reduced from 200 to 168. This was caused, as mentioned previously, by the incompleteness of some interviews and also the difficulty of assigning weights for Title of Position to retirees and students.

TABLE 4.5

DISTRIBUTION OF INNOVATIVE AND LAGGARD EDUCATORS BY EDUCATIONAL LEVEL

Total Years of Education	Type of Educator		Totals
	Innovative	Laggard	
12	0	0	0
13, 14, 15	0	3	3
16	3	2	5
16.5	11	19	30
17	10	15	25
18	64	48	112
19	12	13	25
Totals	100	100	200

TABLE 4.6

AVERAGE NUMBER OF YEARS OF EDUCATION FOR INNOVATIVE AND LAGGARD EDUCATORS

Type of Educator					
Innovative			Laggard		
Mean 17.80	S.D. .74	N = 100	Mean 17.54	S.D. 1.03	N = 100

TABLE 4.7

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS FOR YEARS OF EDUCATION OF INNOVATIVE AND LAGGARD EDUCATORS [4]

Group	N	Mean	S.D.	t
Innovative	100	17.80	.74	2.05*
Laggard	100	17.54	1.03	

[4] d.f. = 99

* $p > .01$; $p < .05$

The scores on the computed Professional Aspirations Index ranged from 17 to 45. In all, there were 34 different scores represented in the range. These 34 scores were then divided into three groups: High, Medium and Low Professional Aspirations with 11, 12 and 11 scores represented in each group, respectively. For the Low group, the range was from 17 to 22.5; for the Middle group, the range was from 23-29; and for the High group, the scores ranged from 29.5 to 45. Graphically, the distribution of persons identified as innovative and laggard educators by professional aspirations is represented in Table 4.8.

Table 4.9 is a contingency table showing the relationship between the observed and expected frequencies for the two groups in this particular instance. For both groups, the greatest number of cases (both observed and expected) fell within the Medium Professional Aspirations level. To test the significance of the cell frequencies for the two groups, a chi-square test was computed. The results of the test (represented in Table 4.10) were not significant at the 0.01 level and therefore Hypothesis Four could not be rejected. We cannot assume with any certainty that the innovative and non-innovative groups differed on the professional aspirations variable.

Supplementary Analysis

The data gathered to test the four research hypotheses were further analyzed to ascertain whether the sex variable had a marked influence upon educational level and/or professional aspirations. While

TABLE 4.8

DISTRIBUTION OF INNOVATIVE AND LAGGARD EDUCATORS BY PROFESSIONAL ASPIRATIONS [5]

Level of Professional Aspirations	Type of Educator		Totals
	Innovative	Laggard	
Low Range: 17-22.5 No. of Scores: 11	12	15	27
Medium Range: 23-29 No. of Scores: 12	43	41	84
High Range: 29.5-45 No. of Scores: 11	35	22	57
Totals	90	78	168

[5]Due to the incompleteness of 12 interviews and the difficulty of assigning weights to Title of Position for 20 retirees and students, the original sample was decreased to 168 for this part of the analysis. The 12 incomplete interviews consisted of nine innovative and three non-innovative educators, while the non-assignable interviews consisted of one innovative and 19 non-innovative educators.

TABLE 4.9

CONTINGENCY TABLE SHOWING RELATIONSHIP BETWEEN OBSERVED AND EXPECTED FREQUENCIES FOR TYPE OF EDUCATOR AND LEVEL OF PROFESSIONAL ASPIRATIONS [6]

Level of Professional Aspirations	Type of Educator		Totals
	Innovative	Laggard	
High	12 (14.4)	15 (12.5)	27
Medium	43 (45)	41 (39)	84
Low	35 (30.6)	22 (26.5)	57
Totals	90	78	168

[6] Expected frequencies shown in parentheses based on the marginals.

TABLE 4.10

CALCULATION OF X^2 FOR DATA IN TABLE 4.11 [7]

Observed Frequency	Expected Frequency	$\frac{(\text{Observed-Expected})^2}{\text{Expected}}$
12	14.4	.23
15	12.5	.98
43	45	.09
41	39	.10
35	30.6	.63
22	26.5	.76
Totals		$X^2 = 2.79$*

[7] d.f. = 2

* $p > .01$

we may treat this section of the report as both interesting and informative, care should be taken not to conclude generalizations from tentative data without the benefit of a more comprehensive base of related research and justifiable hypotheses.

Table 4.11 represents the supplementary breakdown of educational level for those persons identified as innovative and laggard educators by sex. Table 4.12 represents the calculations of the means and standard deviations for the 100 persons identified as male and female innovative and the 100 persons identified as male and female laggard educators. To determine whether the means were significantly different from one another, t tests were performed comparing the means of 1) male innovative and male laggard, 2) female innovative and female laggard, 3) male innovative and female innovative, and 4) male laggard and female laggard educators, (see Table 4.13). In all four cases it was found that the means were not significant at the 0.01 level.

Thus, we cannot assume that, the means for educational level for the four comparison groups in questions are significantly different from one another.

It should be pointed out that in the case of the male innovative and male laggard comparison, the homogeneity of variance assumption was upheld. This had the effect of requiring the use of the pooled variance formula to establish a t value. In the cases of the other three comparisons, this assumption did not hold and the separate variance formula was utilized.

TABLE 4.11

SUPPLEMENTARY DISTRIBUTION OF EDUCATIONAL LEVEL FOR INNOVATIVE AND LAGGARD EDUCATORS BY SEX

Total Years of Education	Type of Educator				Totals
	Innovator		Laggard		
	Male	Female	Male	Female	
12	0	0	0	0	0
12, 14, 15	0	0	1	2	3
16	2	1	0	2	5
16.5	5	6	3	16	30
17	3	7	6	9	25
18	35	29	18	30	112
19	9	3	6	7	25
Totals	54	46	34	66	200

TABLE 4.12

AVERAGE NUMBER OF YEARS OF EDUCATION
FOR MALE AND FEMALE INNOVATIVE AND LAGGARD EDUCATORS

Sex of Educator	Type of Educator					
	Innovative			Laggard		
Male	Mean 17.90	S. D. .76	N=54	Mean 17.75	S. D. .99	N=34
Female	Mean 17.67	S. D. .70	N=46	Mean 17.42	S. D. 1.03	N=66

TABLE 4.13

TESTS OF SIGNIFICANCE OF THE DIFFERENCES BETWEEN MEANS FOR YEARS OF EDUCATION FOR MALE AND FEMALE INNOVATIVE AND LAGGARD EDUCATORS

Group	Statistics				
	N	Mean	S. D.	d.f.	t
Male Innovative and Male Laggard	54	17.90	.76	86	.789*
	34	17.75	.99		
Female Innovative and Female Laggard	46	17.67	.70	**45, 65	1.563*
	66	17.42	1.03		
Male Innovative and Female Innovative	54	17.90	.76	**53, 45	1.643*
	46	17.67	.70		
Male Laggard and Female Laggard	34	17.75	.99	** 33, 65	1.57*
	66	17.42	1.03		

* $p > .01$

** t value determined by averaging t values for 1) degrees of freedom equal to n_1-1 and 2) degrees of freedom equal to n_2-1.

The second supplementary analysis was concerned with the professional aspirations levels of those identified as male and female innovative and laggard educators. Table 4.14 depicts the distribution of the 168 sample subjects into their component parts. Table 4.15 represents the relationship between the observed and expected frequencies for type and sex of educator and for level of professional aspirations. A chi-square test was performed to test the assumption that there was a significant difference among the four groups on the level of professional aspirations (Table 4.16). The chi-square value calculated was found not to be significant at the 0.01 level. The professional aspirations levels of the four groups in this study (male innovative, female innovative, male laggard and female laggard) do not appear to differ significantly.

TABLE 4.14

SUPPLEMENTARY DISTRIBUTION OF PROFESSIONAL ASPIRATIONS LEVEL FOR INNOVATIVE AND LAGGARD EDUCATORS BY SEX

Level of Professional Aspirations	Type of Educator				Totals
	Innovative		Laggard		
	Male	Female	Male	Female	
High	3	9	4	11	27
Medium	23	20	11	30	84
Low	21	14	4	18	57
Totals	47	43	19	59	168

TABLE 4.15

CONTINGENCY TABLE SHOWING RELATIONSHIP BETWEEN OBSERVED AND EXPECTED FREQUENCIES FOR TYPE AND SEX OF EDUCATOR BY LEVEL OF PROFESSIONAL ASPIRATIONS [8]

Levels of Professional Aspirations	Type of Educator				Totals
	Innovative		Laggard		
	Male	Female	Male	Female	
High	3(7.5)	9(6.9)	4(3)	11(9.4)	27
Medium	23(23.5)	20(21.5)	11(9.5)	30(29.5)	84
Low	21(16)	14(14.6)	4(6.5)	18(20.1)	57
Totals	47	43	19	59	168

[8] Expected frequencies shown in parentheses based on the marginals.

TABLE 4.16

CALCULATION OF X^2 FOR DATA IN TABLE 4.17 [9]

Observed Frequency	Expected Frequency	$\frac{(\text{Observed-Expected})^2}{\text{Expected}}$
3	7.5	2.70
9	6.9	2.20
4	3	.33
11	9.4	.61
23	23.5	.01
20	21.5	.10
11	9.5	.66
30	29.5	.01
21	16	1.56
14	14.6	.02
4	6.5	.96
18	20.1	.22
Totals		$X^2 = 9.38$*

[9] d.f. = 6

* $p > .01$

CHAPTER V

CHAPTER V

Summary, Conclusions, Implications for Further Research

A primary purpose of this chapter is to discuss in some detail the data reported in Chapter Four; a second major intention is to recommend suggestions for other researchers interested in pursuing research in this area. While much can be said of any research project, (i.e., how it could have been done more skillfully, economically, etc.) the main concern of this second section will be to suggest timely areas of exploration to which social researchers may address themselves.

The remainder of this chapter is divided into two main subsections: 1) Summary and Conclusions and 2) Implications for Further Research. The summary and conclusions section is presented to help the reader put the findings into a framework from which they may draw their own interpretations. The implications for further research section is designed to aid the reader in applying the present findings to other areas in need of exploration.

Summary, Conclusions

To expedite the enormous task of summarizing and concluding from so much information, the basic plan of this section is to deal with each research hypothesis individually, thus summarizing, concluding, and moving on to the next hypothesis. Although the data for the supplementary analysis did not have the benefit of orientation toward specific

research hypotheses, the results are viewed as interesting from a "reconnaissance" point of view. Therefore, discussion and summary of the findings will be presented, taking care not to conclude generalizations from the tentative data.

The first hypothesis stated that:

1. There is no significant difference between the number of males and females identified as innovative educators.

From Tables 4.1, 4.2, 4.3 and 4.4, we can see that although there is a slight majority of males identified as innovative educators, the results found in this study are not suggestive of a biological (or social) difference between those identified as innovative males and females. We may conclude, therefore, that given the limitations of the study, there appear to be no significant differences between the number of males and females identified as innovative educators. Additionally, the findings of this educational knowledge diffusion study are counter to those in rural sociology studies: persons identified as innovators in educational knowledge diffusion studies are not predominately men, a similar proportion of women share this characteristic in those studies reported.

The second hypothesis, that:

2. There is no significant difference between the number of males and females identified as non-innovative educators,

was disproved as indicated in Tables 4.1, 4.2, 4.3 and 4.4. The breakdown was disportionate with 34 males and 66 females included in this group. The data was further analyzed to determine whether this

difference was significant or possibly due to chance. A somewhat high (.99) significance level was chosen to test the hypothesis. The results of the significance test forced the rejection of the null hypothesis; there appears to be a significant difference between the number of males and females identified as non-innovative (or laggard) educators with women in the majority. We may conclude then that although there does not appear to be significant differences between male and female innovative educators, the same result does not hold true for laggards.

This second result is seen as having two equally feasible explanations. The first deals with exposure to innovations, the second with motivational level within our educational system.

The operative assumption here is that to become innovative in nature, one must be exposed to innovations. It is also assumed that the degree of innovativeness is directly proportional to the amount of exposure to innovations. The majority of professional women employed in our educational system are so in the capacity of elementary and secondary teachers. Although they do have exposure to innovations in education, (through workshops, publications, etc.) this exposure is on a superficial, vicarious level. Usually, most innovations are brought to teachers not by other teachers but by "experts in the academic field." The main argument against their impact upon teachers' ideas is that their "improvements" are not what teachers consider practical for use in their classrooms.

Continuing on with the point stated above, teachers do not seem to interact or identify with these academic "experts". Given their teaching schedules and loads, opportunities for travel to national and regional conferences, innovative schools, etc., do not readily exist. Thus, there appears to be a stand-offish attitude toward innovations that cannot be thought of as "belonging" to the teacher.

The second interpretation of the findings for Hypothesis Two is also based upon the fact that most women educators are employed as teachers in elementary and secondary schools. Given the relatively high remuneration factor of elementary and secondary schools, there do not appear to be as much professional and financial motivation for them to innovate and try new ideas. While academics rely upon the development and publication of innovative ideas for raises, promotions, etc., this is not as true with school teachers. (This interpretation is based upon the social status quo of the educational academic community; more men are employed in college and university academic positions than women.) The same argument would hold true for principals and administrators who rely upon innovative activity to sustain themselves in the educational system. (This group is also considered to be over-represented with male educators.)

The finding for Hypothesis Two is in agreement with the handful of rural sociology studies completed in this area; women, in general, are seen as non-innovative in nature. And as Erasmus (1952) concluded: "...females tend toward more traditional solutions..."

Moving on to Hypothesis Three, which was stated that:

3. There is no significant difference between the arithmetic average of the number of years of education of those identified as innovative and non-innovative educators,

we find that the means for the two groups are very similar: 17.80 years of education for the innovative group and 17.54 years of education for the non-innovative group. The standard deviations were somewhat more dispursed: .74 for the innovative group and 1.03 for the laggard group. The test of significance of the difference between the means of the two groups brought out the fact that while the null hypothesis could not be rejected at the .99 level, it was rejected at the .95 level of significance. This finding supports those studies in rural sociology which conclude that those identified as early adopters (innovators) have more years of education than do those identified as later adopters (laggards).

A plausible but highly improbable explanation of this outcome (given the small mean differences found in this study) could be that as one ascends the educational level "ladder", one becomes more exposed to the theory and practice of innovations. Planned improvement and change through innovations is a goal to which many academics and consequently, their students, aspire.

We may conclude that the members of our sample (both innovative and laggard) are well educated, with 17.8 and 17.5 years of education, respectively. It is important to note, though, that such a small

difference between the two groups (. 26 years of education) should not be over-interpreted.

Hypothesis Four stated that:

4. There is no significant difference between the professional aspirations level of those identified as innovative and non-innovative educators.

Professional aspirations indices were calculated for the sample subjects and they were further divided into levels: High, Medium and Low. As was expected, the medium category contained the most individuals for both groups. A contingency table was then constructed to compare the observed and expected frequencies for the two groups. No drastic discrepancies between observed and expected frequencies were found. The chi-square statistic calculated for this part of the analysis yielded a value which was found not to be significant at the . 99 level. Thus, the null hypothesis could not be rejected. We may conclude therefore, that there appears to be no significant difference between the professional aspirations levels of those identified as innovative and laggard educators. This finding, in an educational knowledge diffusion context, does not support the generalization in rural sociology that early adopters (innovators) have higher aspirations (for educations, occupations, etc.) than late adopters (non-innovators or laggards).

One apparent problem associated with the professional aspirations variable, and possibly an explanation for the present outcome, is that there does not appear to be consensus as to what defines professional aspirations. In this study, for example, educational level, title of posi-

tion, attendance at brief and extended assemblages and subscription to professional journals were chosen to define professional aspirations. Membership in professional organizations, numbers of hours per weeks spent on job and number of articles and/or books published could comprise an alternative set of performances upon which a person's professional aspirations could be judged. In conclusion, we may therefore say that given the definition of professional aspirations in this study, there appears to be no significant difference in professional aspirations between those identified as innovative and non-innovative subjects.

In the supplementary analyses, the research data was further analyzed to ascertain whether the sex variable had a marked influence upon educational level and/or professional aspirations. Table 4.12 represents the means for the four groups in question: Male Innovative, Male Laggard, Female Innovative and Female Laggard. In all four cases the means are very similar; the range being .48 years of education. The standard deviations had a spread of .27 of a standard deviation. Those classified as innovative males led with 17.9 years of education; the group with the least years of education were those classified as laggard females with 17.42 years. The total difference between the most and least educated groups was .48 years of education. A result this small could very well be caused by sampling chance. The second and third groups comprising this quadruplicate were composed of those identified as innovative females and laggard males. Their respective means (and standard deviations) were 17.67 (.70) and 17.75 (.99). Small differences between such means are too difficult to interpret,

although, it should be noted that those identified as male laggards were slightly ahead of those identified as innovative females. Concerning the variable, type of educator, we can see in Table 4.12 that both male and female innovators had higher mean years of education than their non-innovative counterparts. This finding tends to add support to the third research hypothesis outlined above.

Tests of significance of the differences between means were then performed for the four groups. The differences studied were for: male innovative and laggard educators, female innovative and laggard educators, male and female innovative educators and male and female laggard educators (Table 4.13). In all four cases, the differences between groups were not significant at the .99 level. Thus, there do not appear to be any significant differences at this level among the four groups of sample subjects on the education variable further dichotomized by sex.

The second supplementary analysis was concerned with whether the sex variable had a marked effect upon the professional aspirations variable for the innovative and non-innovative groups. Table 4.14 represents the breakdown of professional aspirations level for those classified as innovative and laggard educators by sex. Totals for the four groups show that roughly 35% of the total number of subjects included in this part of the analysis were women who were categorized as laggard educators. Those identified as male innovators comprised 28% of the total group. Those classified as female innovators and male

laggards made up 26% and 11% of the total, respectively. The expected values for these groups (by professional aspirations level) do not show any drastic departures from what would be expected, although as shown in Table 4.16, three categories tended to add more to the chi-square value (thus, indicating a stronger departure of observed frequencies from expected frequencies). The three categories thus identified were male innovators with high and low professional aspirations and female innovators with high professional aspirations. The chi-square statistic calculated in Table 4.16 did not prove to be large enough to indicate that there was a significant, non-chance difference among the groups included in this part of the study.

Thus, although three groups did contribute more to the value of chi-square, we cannot interpret the findings further. Our supplementary analysis did show that the members of our subject sample did contain a disportionate number of persons identified as female non-innovative (35%) and male non-innovative (11%) educators. Whether this finding would hold true for the population in general cannot be determined from the present study because of the lack of supporting hypotheses for this section.

Implications for Further Research

The purpose of this final section is to suggest some areas in need of further exploration and research. While many ideas for extended research activity in this area could have been raised, we will deal with four specific points which are direct extensions of the present study.

In general the four areas include:

1. Replication of the present study;
2. A more detailed study analyzing the sex variable of innovative and laggard educators by the occupational role they assume in the field;
3. Operationalization of the term "professional aspirations"; and
4. Validation of the innovative behavior of educators.

The first point, the necessity for replication of the present study, is mentioned because of the timely nature of the sex variable studied. Much in terms of equal employment opportunity for women has happened since the completion of the original Kettering Study. It is believed that a replication of the study would provide an updated report upon the status of women in the educational field. Following along on this point, it is hypothesized that women will be represented in the innovative category with more frequency. A plausible explanation for the conjecture stems from the fact that as women are placed in higher, more administratively and academically-oriented positions, they will be provided with more opportunities for travel and exposure to innovative ideas. Also, without the class loads of students that classroom teachers must deal with, they will have more time to allocate to professional pursuits.

The second area in need of further research involves the occupational role (i.e., teacher, principal, administrator, academician, etc.) assumed by those classified as innovative and non-innovative educators.

An analysis of occupational role by sex and type of educator is needed to provide information as to which type of educator (and correspondingly which sex) chooses what type of service in education today. Information of this sort would do much to help explain sex differences in innovativeness at different levels of implementation. Not only would the populace be enlightened as to relational aspects of such an analysis, but such data gathering would provide the next step in the comprehensive evaluation of our nation's educators. The proposed research should include more powerful statistical techniques (such as correlation coefficients) to allow analysts to report on the relationships found between types of occupational role and indices of innovativeness.

A third research need involving the present study stems from the various, non-operational definitions given for the term professional aspirations. What is needed is a comprehensive study into the semantics of this term along with research data supporting the justification for more "universal" definition. Such a study should not be considered as peripheral to knowledge diffusion research in general. Clear, unambiguous terms relating to variables under study can be the only avenue to clear, unambiguous research results. Such a definition of professional aspirations would help to provide generalizations to which later researchers may compare their own sample subjects.

The last implication for further research that will be dealt with here has reference to a process long needed in educational knowledge diffusion studies. That is, the validation of educators' responses to

questions concerning their innovative activity is essential if results are in any way to be generalized. Most educational knowledge diffusion studies at the present time rely upon the testimony (usually through face-to-face interviews and mailed questionnaires) of the sample subjects as to their innovative activity. What is needed is a second step to this approach which insures that valid responses have been given. Such methods as follow-up observations, interviews with supervisors, peers, etc., would help to provide valid responses. Unless such a step is taken in future studies, the educational knowledge diffusion discipline will continue to suffer from what Miles (1964) cites to be a "...relative paucity of generalizations...of (educational) innovators."

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APPENDICES

APPENDIX A

THE INTERVIEW INVENTORY USED IN THE STUDY OF EDUCATIONAL KNOWLEDGE DIFFUSION AND UTILIZATION

1. Name _____

2. Title of Position _____

3. Employer _____

4. Years of Professional Education Experience Primarily as:

   a. An elementary or secondary teacher _____
   b. A supervisor or administrator _____
   c. A teacher educator _____
   d. Other _____
   _____

   TOTAL _____

5. Academic Experience:

   a. Do you have a degree? If so, what is the highest? _____
   b. Do you have any graduate credit beyond this degree?
      (a) Less than 4 years of college _____
      (b) Bachelor's degree _____
      (c) Less than 30 hours of graduate study _____
      (d) Master's degree _____
      (e) Less than 90 hours of graduate study _____
      (f) Doctoral degree _____
      _____

6. My purpose in visiting you is to inquire about your experiences with innovative or new educational practices, products, and ideas. When I refer to "new educational practices," I am referring to those that are new to you. I am going to ask you a series of questions in four categories relative to your experiences with new educational practices, products, or ideas.

   First, those that you are aware of and in which you are interested.

Second, those that you initiated and have adopted in your work.

Third, those that you initiated and definitely plan to adopt.

Fourth, those that you would like to adopt.

Before we begin, I would like to make two suggestions concerning the interview. First, don't make the tape recorder rush you in thinking about your answers, take time to think, I have plenty of tape. Second, we know that not everyone will have innovations to discuss in each of the four categories. If after some thought and perhaps some help from me, you can't think of anything we will go on to the next series of questions. Shall we begin?

7. Please identify those new practices, products, or ideas that you are aware of and have attempted to obtain information about? (Mention each by name briefly.)

(Interviewer: Make a written note of each mentioned and then ask the following questions about each. If none are mentioned, go on to the next page.)

a. How did you first become aware of _____?

b. What other sources have you used in gaining information about _____?

ADOPTED INNOVATION

8. Please identify any new practices, products, and ideas that YOU initiated, introduced and have adopted in your work during the past year. By adopted I mean that it is now an accepted part of your work.

(Interviewer: Make a written note of each mentioned, and then subject each to the following series of questions. If no adoptions of innovations are offered, go on to the next page.)

a. Briefly describe _____ (each, one at a time) _____.

b. Describe the procedures you used to incorporate _____ _____ in your work.

(Interviewer: If trial or pilot study is not mentioned, ask the following:)

1. Did you use _____ on a trial basis before you adopted it?

(Interviewer: If yes, go to 1.1 -- If no, go to 2.)

1.1 Explain your methods of assessing the results of the trial phase.

2. Explain your methods of assessing the work of _____ _____.

c. When did you first become aware of _____.

d. How did you become aware of _____.

(Interviewer: Wait for response. If none forthcoming,

suggest readings, people, meetings, conferences, etc. Get specific responses.)

e. What other sources did you use to gain the information necessary to determine the possible usefulness and application of _____ in your work?

f. What influenced your decision to adopt _____ in your work?

(Interviewer: Follow same directions as in d.)

g. What are your future plans concerning the use of _____ _____ in your work?

INNOVATIONS EARMARKED FOR ADOPTION

9. Please identify any new practices, products, and ideas that YOU initiated and definitely plan to adopt in your work within the next year.

(Interviewer: Make a written note of each mentioned, and then subject each to the following series of questions. If no innovations are earmarked for adoption, go on to the next page.)

a. Briefly describe _____ (each, one at a time) _____.

b. What sources did you use to gain the information necessary to determine the possible usefulness and applicability of _____ in your work?

c. When did you first become aware of _____?

d. What influenced your decision to adopt _____ _____ in your work?

(Interviewer: Follow same directions as in b.)

e. Describe the procedures you expect to use to incorporate _____ in your work.

(Interviewer: If trial or pilot study is not mentioned, ask the following:)

1. Do you plan to try _____ on a trial basis before you adopt it?

(Interviewer: If yes, go to 1.1 -- If no, go to 2.)

1.1 Explain the methods you plan on using to assess the results of _____.

2. Explain the methods you plan on using to assess the worth of _____.

f. How did you become aware of _____?

(Interviewer: Wait for a response. If none is forthcoming, suggest readings, people, meetings, conferences, etc. Get specific responses.)

INNOVATIONS OF INTEREST BUT NOT ADOPTED

10. Please identify any new practices, products, and ideas that you would like to adopt in your work, but for some reason you are prevented from doing so.

(Interviewer: Make a written note of each mentioned, and then subject each to the following series of questions. If no innovations are mentioned, go on to the next page.)

a. Briefly describe _____.

b. Describe the procedures you used in attempting to incorporate _____ in your work.

c. When did you first become aware of _____?

d. How did you become aware of _____?

(Interviewer: Wait for a response. If none is forthcoming, suggest readings, people, meetings, conferences, etc. Get specific responses.)

e. What other sources did you use to gain the information necessary to determine the possible usefulness and applicability of _____ in your work?

(Interviewer: Follow same directions as in d.)

f. What influenced your desire to adopt _____ in your work?

(Interviewer: Follow same directions as in d.)

g. Explain why you haven't been able to adopt _____ in your work.

(Interviewer: Attempt to obtain specific reasons.)

SOURCES OF INFORMATION

11. Briefly note the influence of the following information sources upon your knowledge of educational innovations such as those previously discussed:

a. Educational Associates: 1. Which colleagues (that is teachers, principals, supervisors, etc.) prove to be most influential? 2. In what ways are these individuals an important resource?

b. Non-Educational Associates and Friends: 1. Which individuals (that is, neighbors, club contacts, etc.) prove to be most influential? 2. In what ways are these individuals an important resource?

c. Publications (i.e., journals, newspapers, books, etc.): 1. Which particular publications or sections of publications do you rely upon for information? 2. In what ways are publications an important resource? 3. What part do you pay for each of these?

d. Brief Assemblages (1 day to a week -- i.e., professional organization meetings, annual conferences, institutes, etc.): 1. Which particular assemblages do you regularly attend for information? 2. In what ways are these assemblages an important resource? 3. What part do you pay for each of these?

e. Extended Assemblages (several weeks to a year -- i.e., college-level courses, summer and academic year institutes, seminars, etc.): 1. Which particular assemblages do you select for information? 2. In what ways are these assemblages an important resource? 3. What part do you pay for each of these?

APPENDIX B

QUESTIONS PROBED TO DATE UTILIZING DATA GATHERED FOR THE STUDY OF EDUCATIONAL KNOWLEDGE DIFFUSION AND UTILIZATION

Wolf and Fiorino[1]:

1. The extent to which teachers, supervisors and administrators, and teacher educators (a) have adopted innovations within the past year or so, (b) plan to adopt innovations within the next year or so, or (c) tried but failed to adopt innovations within the past year or so, in their personal practice.

2. Determining the influences of recognized diffusion agents upon the adoption of innovations (i.e., practices, products, and ideas that are new to the practitioner) to the personal practice of teachers, supervisors and administrators, and teacher educators.

3. Determining the characteristics of selected target audiences (level of experience, years of professional experience, and earned academic credits) in relation to the adoption of innovations to personal practice.

4. Determining the characteristics of selected diffusion strategies (style, duration, and audience size) in relation to the adoption of innovations to personal practice.

5. Exploring the relationships between five distinguishable stages of innovation adoption reported by Rogers, Lionberger, and others, and the adoption process described by randomly selected educators.

Gulesian[2]:

1. Determining whether innovative educators are generally younger than laggard educators.

2. Determining whether impersonal sources of information are more important than personal sources of information for innovative educators than for laggard educators.

3. Determining whether cosmopolite sources of information are more important than localite sources of information for innovative educators than for laggard educators.

4. Determining whether innovative educators utilize a greater number of information sources than do laggard educators.

Anderson[3]:

1. Determining whether impersonal information sources are most important at the awareness stage and personal sources are most important at the evaluation stage.

2. Determining whether cosmopolite information sources are most important at the awareness stage and localite information sources are most important at the evaluation stage.

3. Determining whether the five-stage adoption concept (awareness-interest-evaluation-trial-adoption) is valid in the field of education.

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1. Wolf, W. C., Jr. and Fiorino, A. J. A study of educational knowledge diffusion and utilization. University of Massachusetts, 1972. (ERIC: ED 061 772).

2. Gulesian, M. G. A study of the age and selected sources of information of innovative and laggard educators. Unpublished doctoral dissertation, University of Massachusetts, 1970.

3. Anderson, B. W. A study of the effects of information sources utilized in the educational decision-making process: Relative stages of adoption analyzed. Unpublished doctoral dissertation, University of Massachusetts, 1971.

APPENDIX C

DIFFUSION AGENTS SELECTED FOR STUDY*

Publications:

Elementary Principal
The National Elementary Principal
School Science and Mathematics
The Instructor
The Saturday Review

Brief Assemblages:

Association for Supervision and Curriculum Development (ASCD) Annual Meeting
National Association of Elementary School Principals (NAESP) Annual Meeting
Association for Childhood Education International (ACEI) Annual Meeting
International Reading Association (IRA) Annual Meeting
ASCD Regional Institute (Denver)
ASCD Regional Institute (Detroit)
ASCD Regional Institute (Minneapolis)
ASCD Regional Institute (Washington, D. C.)

Extended Assemblages:

National Defense Education Act (NDEA) Summer Institute (University of Virginia)
NDEA Summer Institute (Middlebury College)
NDEA Summer Institute (Howard University)
NDEA Summer Institute (Albright College)
NDEA Academic Year Institute (University of Georgia)
NDEA Academic Year Institute (University of Buffalo)
NDEA Academic Year Institute (Bank Street College)
NDEA Academic Year Institute (New York University)

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*Taken from: Wolf, W. C., Jr. and Fiorino, A. J. A study of educational knowledge diffusion and utilization. University of Massachusetts, 1972. (ERIC: ED 061 772)

APPENDIX D

SUBJECTS CONTACTED AND INTERVIEWED BY SUB SAMPLE*

	NAME OF SUB SAMPLE	TOTAL N CONTACTED**	COMPLETED INTERVIEWS
1.	ASCD Institute (Detroit)	19	13
2.	ASCD Institute (Denver)	16	11
3.	ASCD Institute (Washington, D. C.)	21	16
4.	ASCD Institute (Minneapolis)	20	16
5.	NDEA Summer Institute (Virginia)	23	13
6.	NDEA Summer Institute (Middlebury)	35	17
7.	NDEA Summer Institute (Howard)	27	17
8.	NDEA Summer Institute (Albright)	22	14
9.	NDEA Academic Year Institute (Georgia)	28	17
10.	NDEA Academic Year Institute (Buffalo)	27	22
11.	NDEA Academic Year Institute (Bank Street)	22	18
12.	NDEA Academic Year Institute (N. Y. U.)	19	16
13.	School Science and Mathematics	67	50
14.	Instructor	72	35
15.	Elementary English	72	53
16.	National Elementary Principal	56	38
17.	Saturday Review	56	28

18.	Annual Meeting (ASCD)	65	53
19.	Annual Meeting (ACEI)	67	48
20.	Annual Meeting (IRA)	61	40
21.	Annual Meeting (DESP)	80	60
	TOTALS	875	595

*Taken from: Wolf, W. C., Jr., and Fiorino, A. J. A study of educational knowledge diffusion and utilization. University of Massachusetts, 1972. (ERIC: ED 061 772).

**Negative or no response realities caused researchers to select additional names from a pool of random choice for each sub sample.