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A Comparison of the Effect of Using Computer Calls and Personal Calls for Improving Public Attendance in the Public High Schools

Maurice M. McDonald Jr.
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I am submitting herewith a dissertation written by Maurice M. McDonald Jr. entitled "A Comparison of the Effect of Using Computer Calls and Personal Calls for Improving Public Attendance in the Public High Schools." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration.

Gerald C. Ubben, Major Professor

We have read this dissertation and recommend its acceptance:

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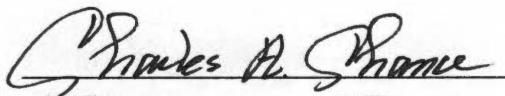
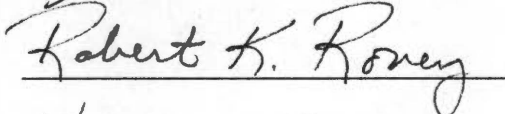
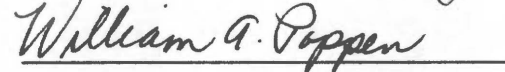
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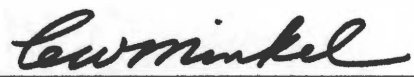
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A COMPARISON OF THE EFFECT OF USING COMPUTER CALLS AND
PERSONAL CALLS FOR IMPROVING PUPIL ATTENDANCE
IN PUBLIC HIGH SCHOOLS

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Maurice M. McDonald, Jr.

June 1986

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ABSTRACT

Research supporting a positive correlation between parents awareness of their children's school absenteeism and improved pupil attendance is limited and studies related to the use of telephone computers as viable alternatives for improving parental notification and reducing pupil absenteeism is non-existent. The primary purposes of the study were (1) to add to the body of research which deals with the relationship between parental awareness and pupil attendance and (2) to provide public school decision makers with data which would assist them in determining if telephone computers are effective, cost-beneficial alternatives to using personnel for notifying parents of their children's non-attendance.

Data were collected from a population of 1767 freshman and sophomore students attending nine comprehensive high schools and located in an urban school district of approximately 65,000 students. Students in three of the high schools were chosen to receive the primary treatment which consisted of a computerized, pre-recorded telephone notification of absence message addressed to their parents and delivered to their homes in the evening following each absence from school. A secondary treatment, which consisted of a similar message addressed to parents but delivered during school hours by attendance personnel, was applied to students in another three schools. The students in the remaining three schools were designated as members of the control, or no treatment, group and received no routine calls when absent from school.

The treatments were administered over a period of 60 days during the Spring of the 1984-85 school year.

Analysis of the data supported the overall conclusions that a strong and positive relationship did exist between parental awareness of their children's absenteeism and the improved attendance behavior of the latter. In addition, the telephone computers were more efficient, productive and cost-effective than personnel in providing notification of absenteeism to parents. Finally, the use of telephone computers by school personnel for notification of absence purposes was considered by parents to be an acceptable mode of communication between home and school.

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CHAPTER I

PRESENTATION OF THE PROBLEM

I. INTRODUCTION TO THE PROBLEM

The problem of student absenteeism has, over the past 15 years, grown into one of the most frustrating issues faced by public school officials. Educational Research Service reported in 1977, that 3.5 million students, or 8 percent of those enrolled in the nation's public schools, were absent on an average day (Educational Research Service, Inc., 1977:2). Another 2 million or more children between the ages of 7 and 17 were not enrolled in any school (Children's Defense Fund, 1974:1). By the mid-1970's, schools in some urban areas were reporting absenteeism figures of 30 percent or higher, while rates of 10 to 15 percent were not uncommon (National Parent Teachers Association, 1975:1). Among the most disturbing attendance statistics, however, were those related to truancy. After an exhaustive review of the literature, Tennent established that roughly one-half of the students reported absent on any given day were truant; that is, their absences could not be attributed to illness or other legitimate causes (Tennent, 1971:16).

A study of changing demographic factors which have been positively correlated with student absenteeism indicates that truancy will continue to be a serious problem for school personnel throughout the 1980's. Current trends, for instance, suggest that more students

will come from minority backgrounds, more will reside in single parent homes, more will come from non-English speaking families, and a higher percentage of teenagers will become pregnant (Educational Research Service, Inc., 1980:2). To further complicate the problem, tight school budgets will inhibit the development and implementation of alternative educational programs for truants and potential dropouts while federal mandates requiring deinstitutionalization of status offenders will diminish the impact of the juvenile courts in assisting educators as they attempt to enforce compulsory school attendance laws.

Despite the less than encouraging picture painted above, one needs only to examine the potential costs of failing to address successfully the problem of student absenteeism to recognize that it must be counted among the top priorities for the nation's schools during the remainder of the 1980's. Today, educators are under more public pressure than at any time in the past to graduate youth who are literate and are capable of supporting themselves and contributing to the maintenance of society. Studies of school absentees, however, indicate that these youth exhibit lower academic performance and demonstrate greater deviant behavior, including delinquency and involvement with drugs (Levine, 1984; Hirschi, 1969; Karweit, 1973; Levanto, 1975; Washington, 1973). Predictably, chronic absentees drop out of school at a rate three to four times greater than non-absentees; and, over time, former truants earn less, have more marital and job-related conflicts, experience more alcohol-related problems, exhibit poorer physical and mental health, and commit a greater number of delinquent and criminal acts (Blake, 1973; Elliot and Voss, 1974;

Hathaway, et al., 1969; Kelly and Pink, 1973; Robins and Ratcliff, 1980; Kandel, et al., 1984).

The cost to society for failing to educate all American youth was placed at 78 billion dollars by the Senate Select Committee on Equal Educational Opportunity in 1972. This outdated figure was based on "the projected costs for lost tax revenues from high school dropouts, welfare, unemployment, crime and crime prevention." This picture is not complete, however, without taking into account the cost to the individual dropout in terms of reduced life earnings, the costs to the school district in terms of lost revenues, and the personal costs to citizen victims of that portion of crime attributed to out-of-school youth (American Association of School Administrators, 1979:27).

Having described the extent of the truancy problem in the public schools as well as its impact upon society, the question arises as to what can be done to reverse this costly trend. Solutions presented in the literature are often as varied and as complex as the theories developed to explain the causes of the phenomenon; furthermore, most preventative programs carry a substantial price tag. Although the cost of prevention would probably be substantially less than paying for the long term result, it is unlikely that many school systems will place a high fiscal priority upon reducing truancy and dropouts in the immediate future. A review of the truancy literature, however, suggests that most schools could noticeably improve their attendance rate with little additional expense by simply doing a better

job of monitoring the attendance of their students and by immediately notifying the parents of absentees.

At first glance, this appears to be a rather obvious and simplistic response to a complex problem. However, studies completed by the Children's Defense Fund (1974) and Kotin and Aikman (1980) documented that most schools do not keep accurate and up-to-date records of students who are chronic absentees; furthermore, their attempts at notifying parents of their children's absences are generally inconsistent and occur well after the fact. While research supporting a positive correlation between increased parental awareness and improved pupil attendance is limited, several pertinent studies which do suggest a strong correlation between the two have been completed and will be discussed in the following chapter. More research dealing with this issue, however, does need to be conducted; consequently, one of the purposes of this study was to add to the existing body of knowledge related to pupil absenteeism.

A second, and more important, reason for the present study was to examine the use of a computerized telecommunications device to determine if such hardware might provide school officials with an effective, cost-beneficial alternative for combating the rising tide of pupil absenteeism. If research demonstrates that timely and consistent notification to the parents of absent students will improve pupil attendance, then school personnel must find a way to complete this responsibility as efficiently as possible. Considering the high cost of labor today, it is no longer practical to use personnel to perform

the kinds of tasks that might be effectively conducted by modern technology.

Telephone computers, or "robots," have been used by several commercial businesses, such as Sears-Roebuck, to communicate with customers since the late 1970's. In the past three years, however, several school districts across the nation have purchased these communication devices and have begun to use them to communicate with parents. Though some of these school systems, which are using the telephone computers to notify parents when their children are absent, have reported dramatic increases in student attendance and general acceptance of the recorded messages by the public, none have generated any formal research reports. The following study was conducted to respond to this need.

II. STATEMENT OF THE PROBLEM

Student absenteeism is one of the most serious and persistent problems which faces school personnel today, and its long range costs to society dictate that the search for effective remedies be given priority attention by school officials. While limited research suggests that parental awareness of their children's attendance problem and their subsequent involvement in its resolution are critical factors in achieving the latter's compliance, too much costly administrative time is required by teachers and principals in implementing effective daily reporting procedures and tracking down chronic offenders; thus, few schools are effectively monitoring absentees and reporting to parents. Furthermore, rising educational costs and shrinking budgets

make it unfeasible for schools to continue to rely solely on people to monitor school attendance. The use of a computerized telecommunications device offers one innovative response to the pupil absenteeism problem faced by public schools today. However, lack of solid research on the impact and implications of using such hardware makes it difficult for educators presently to consider this an efficient, cost-effective alternative in which to commit thousands of dollars.

III. PURPOSE OF THE STUDY

The present study investigated the relationship between parental awareness and pupil absenteeism and the use of a computerized telecommunications system as an innovative alternative to monitoring school attendance. The major purposes of the study were:

1. to determine if immediate and regular parental notification of their children's absences from school would improve pupil attendance;
2. to determine if computerized messages to parents would be more effective than calls from persons in improving pupil attendance;
3. to determine if computerized messages would be equally effective in improving attendance across groups of students with high, moderate and low rates of absenteeism;
4. to determine if the use of computerized telecommunications devices would be received by the public as acceptable modes of communication between home and school;
5. to provide school board officials with data necessary to determine if computerized telephone

systems are cost-effective alternatives for combating student absenteeism.

IV. IMPORTANCE OF THE STUDY

A recent theme in the body of literature dealing with truancy and pupil absenteeism is that parental knowledge of their children's absences from school is an essential factor in improving school attendance. However, relatively few researchers have specifically studied this relationship; thus, there is too little supporting data to establish conclusively that a strong positive correlation exists between "informed" parents and improved pupil attendance. The current study was designed to determine, among other things, if parental knowledge is a significant factor in establishing improved school attendance in a large urban school system. Thus, one important aspect of this study was to extend the limited body of research which now exists with regard to this issue.

Secondly, this study is important because it examined an innovative application of computer technology which has been successfully utilized in private industry for several years to a routine problem experienced by local school administrators---timely communication with parents. The data collected will assist school personnel in determining (1) if telecommunication devices such as the one examined in this paper are efficient, cost-effective alternatives for combating the problem of student absenteeism and (2) if they are acceptable vehicles for facilitating home-school communication in the eyes of the general public.

Finally, while providing information which may influence and guide the efforts of school administrators as they develop more effective policies and strategies designed to address the problem of student absenteeism, this study was intended to increase the general body of knowledge which serves as the basis for generating, refining and revising organizational and educational theory. The data collected and conclusions drawn should raise additional questions concerning the issues under study and stimulate further research in this and related areas.

V. ASSUMPTIONS

In conducting this study, the following assumptions were accepted:

1. In our society, regular school attendance is considered a prerequisite for the adequate education of children.
2. Many parents are unaware of the extent of their children's absences from school.
3. Most parents wish to be kept informed of their children's absences from school and want the chance to affect a positive change in the latter's attendance behavior.
4. Although it cannot be documented in this study that all computerized calls to the homes of absent children will be answered by the parent, the consistency and regularity of the calls and the time of day in which they are made will assure a high degree of parental notification.

5. For comparison and analysis purposes, the results obtained by attendance personnel in the schools where students received personal calls may be considered to be an accurate representation of the kind of performance one might expect from any school official assigned a similar responsibility.

VI. LIMITATIONS AND DELIMITATIONS OF THE STUDY

The present study was delimited to a large urban school district serving approximately 65,000 children. The selected district is under a metropolitan form of government, serves families living in a geographic area covering approximately 600 square miles and includes all of the 119 public schools in the county. The study was further delimited to ninth and tenth grade students attending 9 of the 15 high schools in the district.

One of the primary purposes of the study was to compare the performance of attendance personnel with that of a telephone computer on affecting pupil attendance. The computer was capable of completing calls to the homes of all absent students in three high schools on a nightly basis; however, time and role restraints prevented attendance personnel from handling as heavy a daily load. It was necessary, therefore, to delimit the size of the group receiving personal calls to a random sample of ninth and tenth grade students in the three selected high schools. This step assured that each student who was in the random sample would receive a personal call each time he/she was in non-attendance.

Although effort was made to control for any intervening variables which might serve to contaminate the study, certain factors beyond the control of the researcher may place limitations on the applicability and generalizability of the study. Four such factors were:

1. The state compulsory school attendance law was ruled unconstitutional during the summer prior to the opening of the 1984-85 school year and this action was given considerable coverage by local news media;

2. Court officials made it known that until the unconstitutional sections of the law were remedied by the legislature, truancy cases would not be prosecuted;

3. Annual attendance percentages for the entire school district dropped for the first time after five consecutive years of improvement;

4. Annual attendance percentages dropped in one of the three schools receiving calls by personnel, two of the three schools receiving computer calls and all three control schools.

Another factor which may have had a limiting impact upon the study was that a larger than normal number of instructional days were lost due to snow during the winter, resulting in a cancellation of the Spring holidays. To make up for many of the days in January which were cancelled due to snow, the customary extended break at the Easter holidays was replaced with instructional days. It is feasible that this longer than usual period of instruction without a break may have

contributed to an observed increase in absenteeism which occurred across the district during the second semester.

Finally, the researcher faced some limitations in the design of the study related specifically to the assignment of treatments to groups. Ideally, a pure experimental design with total randomization would have provided the most desirable alternative for giving direction to the present study. However, as is often the case when conducting research in natural settings, certain practical and logistical barriers restricted the selection of schools to be included in the project.

Schools receiving the intervention of the telephone computer, for instance, had to be located geographically on the same side of the county because of the physical location of the machine and the attendance worker who made daily trips to each of the three schools to collect attendance data. Furthermore, the three schools identified as "controls" were the only choices available where no daily procedures for contacting the homes of absent students were in place. Also, the high schools selected for assignment to treatment group I (where home contact was attempted by attendance workers) were randomly chosen, but from only the 10 schools which were receiving the services of assigned personnel prior to the organization of the study.

As a result of the factors identified above, assignment of treatments to groups where each school had an equal chance of selection was not possible with the present study. However, random assignment of subjects within each treatment group was utilized; furthermore, these subjects were matched identically by their pretreatment performance on the dependent variable and the more powerful .01 level of significance

was used to test the research hypotheses in an effort to reduce the possible school effects upon the treatment.

VII. DEFINITION OF TERMS

Attendance personnel. These personnel were classified employees of the school system assigned to one or more high schools and whose primary responsibility is to assist local school personnel with detecting, monitoring and resolving attendance problems of students. In this study, they attempted daily telephone communication with the parents of a randomly-selected number of students in the three experimental group I schools whenever they were in non-attendance.

Control group. These were the three high schools whose ninth and tenth grade absent students received no routine notification calls to their parents when they were in non-attendance.

Experimental group I (also treatment group I). This was the group of three comprehensive high schools whose randomly-selected ninth and tenth grade absent students received daily telephone calls delivered by attendance personnel and addressed to their parents whenever they were in non-attendance.

Experimental group II (also treatment group II). This was the group of three comprehensive high schools whose absent ninth and tenth grade students received nightly computerized telephone messages addressed to their parents whenever they were in non- attendance.

Primary treatment. Daily computerized telephone notification messages addressed to the parents of absent students and delivered in the evening composed the primary treatment.

Secondary treatment. This treatment consisted of personal telephone notification messages addressed to the parents of absent students and delivered during school hours.

Telephone Computer (also telephone "robot," telecommunications device). This term describes any number of commercially-produced pieces of computer hardware units which usually includes a keyboard (for entering telephone numbers and program commands), tape recording components (for delivering pre-recorded messages and taping responses) and a printer (used to document telephone numbers dialed, problems encountered and messages delivered). The device used in this study could be programmed to dial numbers entered any time day or night, repeat calls when numbers were busy, deliver up to 99 pre-recorded messages and printout, by time, a summary of calls attempted and completed (including "bad" numbers). The unit also had the capability of recording responses; however, this component was not utilized in this study.

VIII. RESEARCH QUESTIONS AND HYPOTHESES

The major purpose of this study was to provide answers to the following questions. The research hypotheses with each question were developed in order to test the researchers expectations concerning the relationships between the variables in each problem. It was determined that each hypothesis would be tested at the .01 level of significance.

Question 1. Will pupil attendance improve as a result of providing parents with timely and regular notification when their children are absent from school?

H₁. After treatment, the rates of attendance in the experimental schools will be higher than the rates of attendance in the control schools.

Question 2. Will computerized telephone messages to parents be more effective than personal calls, or no calls, in improving pupil attendance?

H₂. After treatment, the rates of attendance among students receiving computer calls will be higher than the rates of attendance among students receiving personal calls or no calls.

Question 3. Will computerized and/or personal telephone messages differentially affect the attendance of students who are experiencing high, moderate and low rates of absenteeism?

H₃. There will be a statistically significant differential effect on the attendance of students with low rates of absenteeism as a result of their receiving computer calls, personal calls or no calls.

H₄. There will be a statistically significant differential effect on the attendance of students with moderate rates of absenteeism as a result of their receiving computer calls, personal calls or no calls.

H₅. There will be a statistically significant differential effect on the attendance of students with high rates of

absenteeism as a result of their receiving computer calls, personal calls or no calls.

Question 4. Will the use of telephone computers be received by the public as acceptable modes of communication between home and school?

Question 5. Are computerized telephone systems cost-effective alternatives for use in combating pupil absenteeism?

IX. PROCEDURES

In order to address research question number one and to test the first hypothesis stated in the previous section, three high schools were selected to receive the intervention of a computerized telecommunications device for making daily contact with the parents of absent students. Another three high schools were identified to receive the services of attendance personnel to perform the same function. Finally, three high schools in which no routine intervention with absent students occurred were identified to serve as a control group.

In the schools receiving computer calls, the homes of all ninth and tenth grade students who were absent from school received, on the evening of their absence, a recorded telephone message addressed to the parents informing them of their child's non-attendance and providing them with instructions to follow if the absence that day was without their knowledge (see Appendix A). A random sample of ninth and tenth grade students in the three other treatment schools received a similar message, but it was in the form of a personal call completed by an

attendance worker. Only ninth and tenth grade students were selected for this study for the following reasons:

1. Students in these grades have higher rates of daily absenteeism in the selected school system than do juniors and seniors.

2. Most of the students in these grades are between the ages of 14 and 16; thus, their school attendance has traditionally been required by the state Compulsory School Attendance Law.

3. In order to control more carefully the intervention of the telecommunications device, it was determined that no more than 300 telephone numbers should be entered per night. This step was deemed necessary in order to assure that there was sufficient time to contact the home of every student in this experimental group each day that he/she was absent from school.

The treatments described above were applied over an interval of three consecutive 20-day attendance periods during the Spring semester of the 1984-85 school year.

The data were collected in the following manner. The names of all students who were absent from school each day were listed on the daily absentee bulletins of their respective schools while cumulative records of their non-attendance were recorded on data processing forms for monthly entry into the school district's central attendance file. Students in experimental group II who were in non-attendance had their home telephone numbers entered into the telephone computer which was programmed to deliver a notification of absence message to their homes between the hours of 5:45 p.m. and 10:00 p.m. The computer was programmed to re-dial any phone number which was busy up to three times

and to print a summary of the results after each four hours of active dialing. The printout listed by telephone number the time each call was completed (and whether it was on the first, second or third attempt), the number of each call not completed (i.e., those with no answer after three dials) and each number which was "bad" (i.e., those disconnected, changed, or out of order). Students with "bad" phone numbers were removed from the treatment groups if a correct or working number could not be obtained within 48 hours.

In the treatment group where parent contacts were attempted by attendance personnel, it was not possible with existing staffing patterns for one attendance worker to contact the homes of all ninth and tenth grade students absent from one high school on a single day; therefore, a sample of freshman and sophomore students was randomly selected from each school in this group to receive personal calls when they were in non-attendance.

These samples were selected from the total ninth and tenth grade populations in each school after (1) placing the students in rank order (from highest to lowest) according to the number of days which each missed during the 60 days prior to intervention and (2) dividing them into the following 3 strata: high (6 or more days absent); moderate (2 to 5 days absent); and, low (0 to 2 days absent). These divisions were selected after a review of the literature on school attendance suggested that the typical student will miss 4 percent of the academic year for what the school district would consider to be legitimate or "excused" reasons (i.e., illness, death of a relative, family emergencies) (American Association of School Administrators,

1979:7). It was decided, therefore, that a student who missed no more than 2 percent of the instructional days should be considered to have above average attendance (or low absenteeism) while a student missing 8 percent or more of the school year should be considered to have worse than average attendance (or high absenteeism). The ranges of high, moderate and low absenteeism were then established after calculating 2 percent and 8 percent respectively, of 60 days, which was the length of the pretreatment period. After establishing these categories, a table of random numbers was used to select an equal number of students from each strata. Sample sizes for each school receiving personal calls were established by using a table for determining sample size from a given population developed by Chester A. Hauskin (1963:3).

As with students receiving computer calls, data processing forms were used to document officially the cumulative number of days absent for each selected student in group I while attendance workers used daily logs to record the results of their contacts with the homes of the students in this group. At the end of the three 20-day attendance periods over which this study took place, information from the data processing attendance forms for students in both treatment groups and the control group was entered and stored into the school district's mainframe computer. A program was written at the end of the experimental period which retrieved those data in a form which facilitated analysis.

Prior to testing the five hypotheses, it was necessary to assure that the groups being compared were as similar as possible. A matching technique was utilized in order to place all subjects from the

experimental and control groups in identical relation to one another on a pretest measure of the dependent variable (attendance). The main effect of the matching procedure was to reduce initial differences between the experimental and control groups and to reduce sampling error. The matched data were used to test all hypotheses at the .01 level of significance.

In order to answer question 4 regarding public acceptance of the school's use of telephone computers as a viable communications alternative, a brief telephone survey questionnaire was developed and administered at the end of the treatment period to a random sample ($n=375$) of parents of students in the computer called group. Again, Hauskin's table was used to determine sample size and the responses were organized into simple frequency counts and percentages (Hauskin, 1963:3).

Finally, question 5 was addressed by using a cost-effectiveness/benefit analysis model developed by Jin Eun Kim (1979) to compare the performance of the telephone computer with that of an attendance worker. Daily logs (see Appendix B) maintained by attendance personnel provided the vehicle for data collection in treatment group I. Similar data were collected in experimental group II by maintaining the daily printouts (see Appendix C) produced by the telephone computer.

X. ORGANIZATION OF THE STUDY

The present study is organized into the following chapters: Chapter I includes an introduction to the problem, a statement of the

problem, the purpose of the study, the importance of the study, the assumptions which were made, the limitations and delimitations, the definitions of terms, the research questions and hypotheses, the procedures utilized and a description of the organization of the study. Chapter II consists of a review of the related literature and research. Chapter III describes the methodology utilized in the study. Chapter IV includes the presentation and analysis of the data. Chapter V presents the summary, conclusions and recommendations.

CHAPTER II

REVIEW OF RELATED LITERATURE

I. INTRODUCTION

This chapter summarizes the research which was found to support a relationship between parental notification and pupil absenteeism as well as the literature describing telephone computers and their use in addressing pupil attendance problems in public schools. Although numerous books and articles have been published on the topics of school attendance and truancy, the researcher was able to find only five research projects which examined, to some extent, the possible relationship between parental awareness of their children's absenteeism and its effect upon the latter's attendance behavior. While the first section of this chapter will review these studies, the second section will report what the literature has to say about the use of telephone computers for attendance and other purposes in the public schools. Finally, a summary will be presented.

II. RELATED RESEARCH

To date, no extensive research projects have been published regarding the use of telephone computers to combat pupil absenteeism in the public schools. However, several studies have dealt with the effect of various kinds of communication with parents for the purpose of influencing their children's attendance.

According to statistics reported by Levine (1984:139), notification of a student's unwarranted absenteeism to his or her parents will be sufficient to control the problem in 98 percent of the cases. Her position, if not her high rate of success, is supported by two studies which focused upon principal-initiated contacts to the parents of elementary students who were exhibiting poor attendance.

The first was conducted in 1972 by Copeland, Brown, Axelrod and Hall. These investigators were primarily interested in the effects of social attention upon behavior, and they conducted their research with nine elementary students who were enrolled in a non-mandatory remedial summer school program. Specifically, Copeland and his associates measured the effects of a principal praising parents for their children's attendance. The principal initiated calls to the homes of two groups of students when they were absent from school. With one group, he praised the parents for encouraging their children's attendance while the second group received a notification call only. Although children in both groups improved in attendance immediately after their parents received calls, absenteeism in the notification-only group tended to reoccur over time while the group receiving praise experienced significantly better attendance throughout the experiment. From the data collected, the authors concluded that some student behaviors (i.e., attendance) could be more easily influenced by reinforcing parents than by rewarding their children. Although these authors were primarily interested in the issue of social reinforcement, their study does document the existence of parental influence over their children's school attendance.

Parker and McCoy (1977) replicated Copeland's study, but introduced an additional dimension. The principal, in this case, praised eight elementary-aged chronic non-attenders directly for good attendance, called the parents of another group and praised them when their children attended and called the parents of a third group with a negative message when their children were absent. The results of their analysis again supported the influential power of parents to affect positively their children's attendance behavior. The groups of children whose parents received both positive and negative calls experienced prolonged improvements in attendance while the children receiving direct praise increased immediately but did not maintain their improved attendance.

Another relevant study was conducted by Fiordaliso and associates (1977) and assessed the effects of feedback to parents in reducing absenteeism among adolescent junior high school students. The attendance of two experimental groups (one receiving more immediate and regular calls than the other) and a control group (receiving no calls) was monitored over the course of a school year. Both experimental groups demonstrated significant improvement over the control group in attendance, with the group receiving more frequent calls performing the best.

Fiordaliso's analysis is important with regard to the present study for two reasons. First, it examined the attendance behavior of older (secondary) students and secondly, the calls were implemented by a school nurse. This is a point worth emphasizing because it demonstrates that notification calls to parents are effective in

improving pupil attendance, regardless of who makes the call. In the first two studies it could be argued that the telephone contacts were successful primarily because they were made by the principal (who holds a position of authority). Fiordaliso's study, on the other hand, suggests that others may assume this responsibility just as effectively.

In a 1979 publication by the American Association of School Administrators (1979:40), the principal was identified by 43.1 percent of the respondents as the staff member primarily responsible for pupil attendance in the local school building. However, the broad nature of the principal's role usually makes it difficult for him or her to allocate consistently the time necessary to implement personally an effective parental notification program, even if it is a priority. In a survey of principals which identified student attendance as one of their primary concerns, the respondents agreed that while more attention needed to be given to this problem in their schools, they also indicated that too much administrative effort and time was already allocated to attendance-related tasks (Brimm, Fogerty and Sadler, 1978). In light of this concern, the study by Fiordaliso and another by Sheats and Dunkleberger (1979) becomes most significant. The latter found that a school secretary could effect the same positive result as the school principal upon initiating calls to the parents of absent students; thus, from these analyses it is reasonable to conclude that if a teacher or other school employee "can foster the same positive influence that has been achieved by the principal's contacting the

home, then a program of frequent telephone calls to parents becomes administratively much more practical" (1979:310).

The final study examined was one conducted by Ronald G. Bittle (1977). He experimented with a telephone answering system to inform parents of their children's absences. Parents of 37 chronically absent students were given a special telephone line which they could use to check on their child's attendance during the last 6 weeks of school. The special number was used 247 times and of the 37 students, 19 experienced significant gains in attendance, despite the fact that it was the end of the year (a time when attendance was normally on the decline).

In addition to the research projects described above, numerous articles written by practitioners and theorists in the field of education may be found which emphasize the value of parental knowledge as a necessary ingredient for improving and preventing serious pupil attendance problems. Levine (1984:139-141), in an article describing an assessment tool for early intervention in truancy cases, identified lack of parental knowledge of their children's absenteeism and inadequate recording, reporting, and followup by school personnel as two conditions in different settings (home and school) which must be corrected in order to improve attendance. Several writers have emphasized that unless parents are knowledgeable of their children's absenteeism and involved in reinforcing the expectation of regular school attendance, then efforts by school personnel (including legal responses) will be unsuccessful in improving the situation (Patthoff,

1979:147; Shelton and Garrett, 1977:44-49; Poole 1959:25; Suprina, 1979:27-31).

Two reviews of literature were especially helpful in understanding the significant role of parents in addressing problems of attendance. Brown (1983) cited several sources (particularly Mitchell and Shepherd, 1980:20) which indicate that parents of non-attending students are very much interested in the education of their children and, if kept informed of their absences, would support school personnel in their efforts rather than collude with their children (as some writers on truancy have suggested). Birdsong (1980:123), in attempting to pull from the literature a profile of the chronic truant, reported that many parents ". . . were not aware of their child's poor attendance and . . . were grateful and willing to confer with attendance personnel" to effect a positive change.

Articles by two attendance specialists also emphasized the importance of home-school communication in assessment and remediation of attendance problems. Stenson (1980), a Visiting Teacher/School Social Worker, proposes a "crisis intervention model" for improving pupil attendance which is valuable for determining in which families the parent will be an influential factor with whom to work. Miles and Ury (1978) were attendance specialists who proposed a shift in the modern role of attendance workers from "enforcers of compulsory attendance" to "community outreach workers" whose primary position would be that of an intervention specialist providing support for parents of truants. Both of these writers emphasized the need of

parents to know of existing problems and recognized the central role of the latter in resolving attendance issues.

Finally, two articles by practicing school administrators exemplify well the many local school practitioners who recognize the importance of early parental notification and support in remediating problems of pupil attendance. Jett and Platt (1979) examined a successful school attendance improvement plan which required the services of an attendance clerk. Among the primary responsibilities of this full-time position were the establishment of immediate and regular communication with the parents of absent students and the monitoring of results. Levanto (1975), on the other hand, analyzed a Connecticut study of school absenteeism and provided some valuable suggestions for dealing with the problem. While emphasizing that there is an urgent need for additional research around the issue of pupil absenteeism, this high school administrator suggested that the responsibility for attendance must be shifted to the student and his parent. However, the school must develop effective and efficient reporting procedures to keep parents informed.

III. TELEPHONE COMPUTERS

The review of the literature on pupil absenteeism demonstrates that it is reasonable for schools to make contact on a daily basis with the parents of all absent students; however, studies by Kotkin and Aikman (1980) and the Children's Defense Fund (1974) suggested that most do not keep accurate, updated attendance records nor do school personnel effectively report absenteeism to parents. The primary

reason given by school administrators for this shortcoming is that they lack the resources for getting the job done (American Association of School Administrators, 1979:40-41).

Daily communication with the parent of every child in non-attendance, even in a relatively small school, would consume too much administrative and instructional time of principals and teachers. Furthermore, it is no longer economically feasible for a school or district to rely solely upon personnel to perform this notification function. Consequently, several school districts across the country have begun to experiment with telephone computers in an attempt to resolve some of the problems related to pupil attendance.

Although insufficient research has been completed to date which would provide enough data to evaluate thoroughly these telecommunications devices, several school systems have utilized them long enough to observe positive changes in attendance. Hartwell (1984), for instance, reported that a Florida school had reduced its truancy rate by 59 percent during the first 3 months of using a telephone computer. After only one week of use, an Alabama school reduced its number of daily absentees from an average of 116 per day to 86 (Hartwell, 1984:26).

The first school believed to have used telephone computers for attendance purposes was in Canoga Park, California. Its rate of absenteeism was reported to have dropped 52 percent after the first 3 months of use. This reduction was converted to \$30,600 in additional funding (Los Angeles Times, June 5, 1983:6). A Virginia school which was averaging 190 absences per day claims to have cut its number of daily absentees to 70 after using a telephone computer for one year

(Washington Post, August 26, 1983:6). And, in Chicago, two of the five schools with the lowest average daily attendance used telephone computers in a pilot program. After a year, one of the schools raised its attendance rate from 80.5 percent to 85.8 percent, while the second moved from 78.8 percent to 86.4 percent (Chicago Tribune, January 5, 1983:C6).

While telephone computers are relatively new to the field of education, they have been in operation for several years in the private sector. Sears-Roebuck, for instance, has purchased approximately 1,200 of these computers and has used them to collect bills and to notify customers that orders have been received. One minister is known to have used such a device to make contact with his congregation each week and, in California, telephone "robots" (as they are called) are used regularly by doctors, lawyers and other businessmen to attract new clients (The Daily Break, May 13, 1982:13).

Although there were at least seven different models on the market at the time the present study was conducted, most operated with a similar basic system including a stand-alone dialer (for a chart comparing model features, see McGinty, 1985:24-27) with two tape recorders. One recorder plays a voice-activated taped message while another can be programmed to record a response from the party called. Most of the units provide a keyboard similar to a Touchtone phone for entering numbers, although, in some models, data can be downloaded directly from a microcomputer or entered from a cassette tape. Once loaded, these devices can dial between 1 and 2,000 telephone numbers from memory. The dialer is controlled by a timer which is programmed

by the operator to start and stop at specified times. Existing systems can handle from 1 to 99 different messages and, depending upon the degree of sophistication, range in price from approximately \$1,000 for a modem system which runs off a microcomputer to \$10,000 for a package which includes a dialer, a computer, attendance software programs and an optical card scanner. Also, most of the systems provide printout features, though the print capabilities of the various products vary considerably (McGinty, 1985:26).

The unit used in the present study was capable of transmitting multiple messages (up to 99), could store up to 1,000 phone numbers, included 2 high-quality stereo tape decks for transmitting and receiving messages, had an optional printer, long term number storage capability (which allowed the user to program the number of times a busy or non-answered number should be redialed), a battery backup feature, and a phone company intercept which prevented the unit from communicating with another machine.

Though literature describing the use of telephone computers by public schools is extremely limited beyond that which has been prepared by manufacturers for commercial purposes, in the few newspaper and periodical articles which do exist, there is little disagreement as to why school personnel are attracted to these telecommunications devices. First and foremost, they are time-savers. Not only are personnel freed from the drudgery of making repeated phone calls each day, but the telephone computers, by virtue of the fact that they can be programmed to call in the evening when parents are most likely to be home, are more productive. A Georgia high school principal reported

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that his machine had a daily contact completion rate exceeding 80 percent, which was well above the success rate of manual calling during school hours (Gwinnett Daily News, November 23, 1985:1A).

According to the same administrator, the computer was also a cost-saver. Based on state reimbursement estimates for pupils in attendance, if the absentee rate in his school decreased by only 10 students a week, the price of the computer would be recouped in 4 months. Furthermore, paying personnel (whether it is a secretary, teacher or administrator) to perform the task of routinely contacting the parents of absent students, increases expenses and results in other school business going unattended (Hartwell, 1984:26).) cite

Because telephone computers work every day--taking no coffee breaks or sick leave--performing their tasks with the same tireless and pleasant voice, work after hours and on weekends and don't require pay raises and fringe benefits, they cut into the high annual costs for labor. Although it is not suggested in the literature that computers can meet the intense needs of students now provided by professional personnel, it is recognized that, in the area of parental notification, telecommunications equipment is much more productive. A truant officer from Chicago reported, for example, that ". . . I put 360 numbers into the machine [on Monday]. Eleven officers only made 342 investigations for the whole week" (New York Times, February 18, 1983:D23).

Hartwell (1984) reports that telephone computers enhance the roles of professional attendance staff by taking care of the casual non-attender, thus, leaving personnel more time to devote to the more serious truancy problems.

While school administrators agree that the most effective use of these telecommunications systems is in contacting the parents of absent students, many have recognized and creatively taken advantage of the functional versatility of the computers. Numerous examples may be found where schools have employed the computers to make wakeup calls, announce report card dates, innoculation requirements, Parent Teachers Association meetings, sporting and other extracurricular events, graduation information, school closings, teacher conference procedures, and to conduct surveys and polls. In addition, they have been used to report multi-lingual messages (Leedy, 1985).

When one considers the extent to which these computers may be used, perhaps one of the most significant findings repeated in the literature is that their employment appears to be generally well-accepted among the parents of school-aged children. As one administrator responded, "I've been impressed with the low amount of complaints" (Gwinnett Daily News, November 23, 1985:1A). Hartwell (1984:26) concludes that the public has been receptive to school use of these devices because it views truancy as a serious community problem which school personnel have taken positive steps to correct.

IV. SUMMARY

When one combines the findings of the research studies described in this chapter with the writings of the various authors in the field, it is logical to conclude that regular contacts from the school to the parents of chronically absent students will, in most cases, help reduce absenteeism. Furthermore, as research has

demonstrated, this reduction is not determined by the person, or the role (i.e., the principal) which that person fills. Finally, although further controlled research is needed to establish firmly a positive correlation between early parent notification and improved attendance, there is sufficient evidence to support the position that a program of efficient reporting of non-attenders should be the first step in establishing regular school attendance.

The use of computerized telecommunications systems by school personnel to address the latter's responsibility for providing parents with immediate and accurate pupil attendance information appears to be a creative and practical application of modern technology to the resolution of a significant educational problem. Although the movement to utilize telephone computers in public schools on a widespread basis is obviously in its infancy, as evidenced by the paucity of research and literature on the subject, it is likely to pick up momentum throughout the eighties. Andrew Zucker (1978:229) suggested that the use of telecommunications in public education will increase rapidly during the current decade and that ". . . the important questions for public debate relate to the effectiveness and social value of such application." The primary purpose of this study was to generate data which could contribute to the resolution of this debate.

CHAPTER III

METHODOLOGY

This chapter includes descriptions of the population and sample (including method of selection), the treatment and design, the data collection techniques, how the data were presented, and how the data were analyzed.

I. POPULATION

The population selected for this study was composed of ninth and tenth grade students in nine comprehensive high schools located in a large urban school district serving approximately 65,000 students. The school district was under a federal court desegregation order and each school in the system was integrated according to racial guidelines mandated in that order. This factor becomes significant as one considers the limitations which the researcher identified in Chapter I regarding the assignment of treatments to groups. Although strict randomization procedures could not be employed in assigning the treatments to every school in the project, this violation becomes less critical when one considers that an effect of the desegregation plan upon the school system under study is that it has tended to make student populations in the identified schools more alike than unique.

Students in three of these schools (hereafter designated as schools "A," "B" and "C") were chosen to receive the primary treatment (computerized notification of absence calls) while students in three

others (hereafter designated as schools "X," "Y" and "Z") received a secondary treatment (personal calls). Three schools (C_1 , C_2 and C_3) were identified as controls and these students received no treatment. Table I is presented for the purpose of providing the reader with a better feel for the schools involved in the study and their relative position in the school district in terms of enrollment and percent of attendance.

In order to answer the questions and to test the research hypotheses presented in this study, the population was organized in the following manner. All ninth and tenth grade students in schools A, B and C received the primary treatment (a recorded message to their parents delivered by a telephone computer) when they were absent from school. In schools X, Y and Z, however, only a sample of the ninth and tenth grade students on roll received the secondary treatment when absent (a similar notification message addressed to the parents but delivered by attendance personnel). It was necessary to treat a sample rather than the entire freshman and sophomore populations in the latter three schools because attendance personnel found it impossible within their scheduled work hours to complete daily telephone contact with the homes of all absent ninth and tenth grade students while continuing to assume their other duties. By selecting a sample of students in schools X, Y and Z, thus reducing the number of potential telephone calls to a manageable level, it became possible to assure that all students in the study would receive similar treatment consistently upon incurring an absence from school.

TABLE I
COMPARISON OF ENROLLMENT AND ATTENDANCE DATA FOR
EXPERIMENTAL AND CONTROL SCHOOLS

Group	School	Enrollment by Grade (1984-85)					Percent of Attendance	
		9	10	11	12	Total	1983-84	1984-85
Received Personal Calls (Experimental I)	X	260	158	147	124	689	81.8	84.9
	Y	335	253	230	206	1024	89.3	88.3
	Z	607	401	318	356	1682	92.7	92.7
Received Computer Calls (Experimental II)	A	484	350	271	255	1360	92.5	90.4
	B	387	275	247	284	1193	95.2	94.0
	C	361	308	296	290	1255	93.4	93.7
Received No Calls (Control)	C ₁	-	337	261	254	852	93.4	92.5
	C ₂	127	105	101	88	421	95.0	93.9
	C ₃	354	202	185	208	949	91.0	89.9
System-Wide	-	5271	3998	3454	3220	15943	92.5*	91.9*

*Figures designate yearly averages for all freshmen and sophomores in the school system.

The selection of the sample was completed by strictly adhering to random procedures. First, the entire freshman and sophomore classes from schools X, Y and Z were rank-ordered (from highest to lowest) by computer according to the number of days each student had been absent during the 60 days prior to implementing the treatment. A separate, rank-ordered listing of students was printed for each of the three schools and each list was then divided into three categories.

Students who had been absent six or more days were considered to have "high absenteeism" and were separated into one group; those who had missed two to five days were considered to have "moderate absenteeism" and made up a second group, while those who had experienced fewer than two absences were determined to have "low absenteeism" and were grouped together. These categories were defined by the researcher after a review of the literature on school attendance indicated that the average student will miss approximately 4 percent of each academic year for reasons considered legitimate or "excused" (i.e., personal illness or family emergency). Thus, it was decided that a student who had been absent less than 4 percent (in this case, 0 or 1 day) of the 60 school days prior to treatment should be considered to have good attendance (a low rate of absenteeism). The remaining two categories were arbitrarily defined.

After the rank-ordered, stratified lists of students from each of the three schools in treatment group I, were sequentially ordered, a table for determining sample size from a given population (Hauskin, 1963) was used to establish the number of students to be selected from each school. Each sample included an equal number of students from

each of the three attendance categories in order to achieve proportionality among subjects with high, moderate and low rates of absenteeism. A table of random numbers prepared by Lynch and Huntsberger (1976:389-392) was used to complete the selection of students whose parents were to receive notification of absence calls from attendance personnel (treatment Group I).

The researcher chose to use a pair-wise matching procedure in order to demonstrate that each groups' performance on the dependent variable was essentially the same prior to the introduction of the treatments. Utilization of the matching technique, however, required the selection of random samples of students from both treatment groups and the control schools. As with treatment group I, samples from the computer group and the control group were selected by rank ordering the students according to their attendance (from low to high absenteeism) during the 60-day pretreatment period.

The matching procedure was completed by taking the smallest of the three groups, students receiving personal calls, and drawing as many perfect matches on pretreatment attendance scores as possible from the computer called group (treatment group II) and the control group. It was found that 589 students from group I had at least one perfect match in the latter two groups. A table of random numbers was used to select a total sample of 589 students from each matching attendance category from the computer called schools and the control schools. Upon consulting Hauskin's (1963) table for determining sample size from a given population, the researcher found the 1,767 matched subjects to be far beyond the recommended 217 subjects suggested by the author.

In addition to the treatment samples described above, a third sample of students was selected at the conclusion of the experimental period. This sample was randomly drawn from the total population of students in treatment group II who received the primary intervention (computer calls). The parents of these selected students were interviewed by the researcher for the purpose of determining how they felt about the use of telephone computers as modes of communication between home and school. This sample ($n=375$) was drawn using the same procedures utilized in selecting the treatment samples. The parents were interviewed by way of a personal telephone call to their homes and, after a brief explanation regarding the purpose of the study, each was asked to respond to the following questions:

1. Do you remember receiving computerized telephone messages during the past school year notifying you when your child was absent from school (yes or no)?

2. Were you aware that a computerized call was made from the school to your home each time your child was absent (yes or no)?

3. Do you think that your child's attendance was better as a result of his/her awareness that these calls were being made (yes, no, or don't know)?

4. Do you favor or object to the use of telephone computers by school personnel for reporting daily student absenteeism to parents (favor, object to or no opinion)?

If the parent answered that he or she objected to the use of computerized notification calls, or had no opinion, the following question was asked.

5. If it could be demonstrated that the use of telephone computers are as efficient and less expensive than the use of personnel to report daily student absenteeism, would you then favor or object to their use for this purpose (favor, object to or no opinion)?

II. THE TREATMENT

The primary purpose of this study was to investigate the use of a computerized telecommunications system in monitoring school attendance and to determine if such an innovation offers an efficient, cost-effective alternative to present methods. In order to achieve this purpose, two experimental groups and one control group were formed.

Students placed in experimental group II (described in section I of this chapter) received the primary treatment which consisted of a computerized, prerecorded telephone message addressed to the parent and delivered to the home in the evening following every absence from school. The message (see Appendix A) was designed simply to inform the parent of the student's non-attendance and to provide instructions for the former to follow if the absence was without their knowledge. The computerized messages were delivered daily between the hours of 5:45 p.m. and 10:00 p.m. The computer was programmed to redial each telephone number entered up to three different times in instances where it encountered a busy signal. When a call was completed or a "bad" number was dialed, the computer recorded the results on a daily printout; thus, bad numbers could be corrected and homes not contacted on one day could be re-entered the next. When "good," or correct,

telephone numbers for a particular student could not be obtained, he or she was removed from the study.

The parents of students placed in experimental group I received a similar telephone message following each absence from school; however, these calls were placed by attendance personnel and were delivered between the hours of 9:00 a.m. and 3:00 p.m. each day. The results of these personal calls were recorded on a daily log maintained by the attendance worker (see Appendix B).

A control group was formed by developing a roster of all ninth and tenth grade students in three high schools where no routine intervention had been implemented to inform the parents of student absenteeism. As in the treatment groups receiving computerized and personal calls, a rank-ordered, stratified listing of students receiving no treatment was developed to facilitate data comparison and analysis.

The treatments described above were applied over an interval of three consecutive 20-day attendance periods during the Spring semester of the 1984-85 school year. The experiment was deliberately initiated after the threat of severe winter weather had subsided and was terminated prior to the final two weeks of school; thus, the selected time period presented as normal and uninterrupted an attendance schedule as is possible to observe during a typical school year.

III. THE DESIGN

An experimental design was chosen for this study because the researcher sought to control for as many sources of internal and

external invalidity as possible. To qualify as a true experimental design, the study had to involve random assignment and the use of a control group. Since the primary purpose of the study was to compare the effectiveness of using telephone computers with more traditional alternatives (i.e., personal calls or no routine calls) of notifying parents regarding pupil absenteeism, a pretest-posttest control group design (for three groups) with matching was selected.

The design for this study took the following form

R	Ex ₁	O ₁	T ₁	O ₂
R	Ex ₂	O ₃	T ₂	O ₄
R	C	O ₅		O ₆

with experimental group I (Ex₁) receiving the intervention (T₁) of attendance personnel, experimental group II (Ex₂) receiving computerized intervention (T₂) and the control group (C) receiving no intervention. The pretest scores in this study (O₁, O₃ and O₅) represent the total number of days absent from school which was experienced by the members of each of the three groups during the 60 days prior to applying the treatments. The posttest scores (O₂, O₄ and O₆) indicate the days of non-attendance for the 60 days following the treatments. As indicated in section I above, the students in each of the three groups were identically matched on their pretreatment (pretest) scores and randomly selected from their respective treatment groups. The R in the design designates the use of randomization techniques in sample selection.

Donald Campbell and Julian Stanley are recognized among the most authoritative sources for their work in experimental design (Gay, 1976:166). Their Pretest-Posttest Control Group Design,

R	O	X_1	O
R	O	X_2	O
R	O		O

was selected for use in this study because of its strength in controlling for all sources of internal invalidity. According to Campbell and Stanley, the following classes of extraneous variables might affect the internal validity of an experiment: history, maturation, instrumentation, testing, mortality, regression and selection (Borg and Gall, 1979:522-525).

The above design controls for the effect of history and maturation in that it utilized a control group. Any event that may have caused a change to occur in the treatment groups, for instance, should also be observed in the control group. Maturation is further controlled by randomization. Since all sample participants in the study were randomly selected from subgroups which had been matched and organized homogeneously on the dependent variable, there is no reason to suspect that maturation would effect one group more than another.

Testing and instrumentation are extraneous variables which would be controlled by the design; however, the dependent variable in this study is attendance behavior and there was no reactive testing of any of the participants. Furthermore, neither statistical regression nor selection were threats to the validity of the study because participants were randomly selected from perfect group matches to

assure that initial sample differences would not account for any posttest differences. Finally, the influence of mortality was easily determined because each subject in the study was identifiable in the data gathering procedures and could be accounted for at the conclusion of the study; furthermore, mortality was controlled by matching on the pretest.

The only definite weakness of the pretest-posttest control group design has been identified by Gay (1976: 180) as the existence of a possible interaction between the pretest and the treatment which may make the results generalizable only to other pretested groups. As indicated above, the pretest in this study consisted of attendance behavior observed over a period of 60 days rather than a reactive measure (i.e., an attitude scale). Thus, the possibility of this threat to the external validity of the study is believed to be virtually non-existent.

IV. THE COLLECTION OF DATA

The data were collected in the following manner. The home telephone numbers of all students in treatment group II (schools A, B and C) who received a recorded notification of absence message when in non-attendance were recorded on a daily printout produced by the telephone computer (see Appendix C). These daily printouts were maintained in chronological order by school for the duration of the 60-day intervention period.

The parents of students in treatment group I (schools X, Y and Z) received personal telephone messages when their children were absent

from school. The results of these personal contacts were recorded on daily logs maintained by the attendance personnel who completed these calls (see Appendix B). In both treatment groups data were collected in a manner that made it possible to determine if a call was completed to the home of each student reported absent from school on a given day.

At the end of the experimental period, the school system's mainframe was used to organize the attendance data for all students in both treatment groups and the control group in a form that facilitated analysis. A program was written which scanned the attendance files for each student entered into the study and counted their total number of absences during the 60 days before and after implementation of the treatments. In addition, the program computed a difference, or gain score, for each student by subtracting the number of absences each experienced during the 60 day pretreatment period from the number accumulated during the 60 day posttreatment period. Appendix D provides a sample of the data which were generated by this program and the form of its organization.

By analyzing the data produced by this report, it was possible to address the first research question presented in this study and to test H_1 . Appendix E provides a sample printout from the computer which illustrates how the raw data was reorganized. Column one designates the identification number of the subjects from each of the three groups, while columns two, four and six designate the pretest score upon which each subject was matched and columns three, five and seven indicate the subjects' posttest scores (or, numbers of days absent following the 60 days of treatment).

Data needed to address question four, regarding public acceptance of telephone computers as viable methods of communication between home and school, were collected and summarized by the researcher after conducting telephone interviews with parents of randomly selected students from treatment group II. This information was recorded and coded by hand. A summary of the individual responses from these interviews is presented in the following chapter.

Finally, question five (regarding the cost-effectiveness of the two methods of notification) was addressed after organizing and studying performance data collected via (1) daily printouts generated by the telephone computer, (2) daily logs maintained by attendance personnel and (3) salary/fringe benefit and attendance reimbursement figures provided by the personnel office of the public school district in which the project was conducted.

V. PRESENTATION OF THE DATA

The first task in presenting the data was to organize it in a fashion which would facilitate analysis of the questions (Q_1 - Q_5) and hypotheses (H_1 - H_5) addressed in the study. Tables and graphs were prepared to assist in determining the existence of any possible relationships between the variables under examination.

To address Q_1 , tables were prepared which illustrated the attendance patterns among the students in the two experimental groups and the control group during the 60 days before and after the interventions. Others were prepared for the purpose of observing the existence of any significant differences (which might be attributed to

the treatments) between the attendance of pupils in the experimental schools and those in the control schools (H_1).

A second series of tables were created in order to compare more easily the effectiveness of the treatments under study (Q_2 and H_2) and to determine whether they appeared to have a differential effect upon students with variable rates of attendance (Q_3 and H_3). Graphs were also prepared to permit visual inspection of the effects which occurred after applying the treatments (see Figures 1 and 2).

Finally, Q_4 was addressed through examination of the parent survey summary. A cost/benefit comparison (Q_5) of the use of telephone computers versus the use of personnel as one alternative for addressing the problem of pupil absenteeism.

VI. ANALYSIS OF THE DATA

When using a pretest-posttest control group design, Gay maintains that there are three basic ways by which data can be analyzed in order to test the research hypotheses and to determine treatment effectiveness (1976:181). First, the researcher may choose to compare the pretest-posttest scores of each group. Second, he or she may compute the difference (or gain) scores for each subject in the study, average them by group and then compare the mean gain of each. Third, he or she may simply choose to compare the posttest scores of the group.

There are problems associated with each method. In the first, for example, suppose upon comparing pretest and posttest scores of the experimental and control groups, the former group improves

significantly over the latter. One cannot necessarily assume that the difference was due to the treatment unless it can be shown that both groups were of equal ability on the dependent variable at the onset of the experiment. With the second method, a similar problem exists. Since all subjects in a study do not have the same room to grow, or "gain," the computation and comparison of groups on the basis of their pretest to posttest gain scores may be suspect unless, as in the first instance, the experimental and control groups perform essentially the same on the pretest.

Gay supports the third method of comparing the posttest scores of the groups. In this case, the pretest serves only to determine if the experimental and control groups are similar on the dependent variable. If they are, Gay recommends using a t-test to compare the posttest scores of each group (or an analysis of variance when more than two groups are involved).

The t statistic and the F statistic (analysis of variance or ANOVA) are parametric measures which, though generally preferred because of their power, are usually contingent upon assurance that the following major assumptions are met:

1. The variable measured is normally distributed in the population;
2. The data represent at least the interval scale of measurement;
3. The subjects are selected independently for the study;
4. The variances of the population comparison groups are similar (Borg and Gall, 1979: 455).

A thorough examination of the data revealed apparent violations of two of these four assumptions. First, the recognized data for all three groups yielded positively skewed distributions, thus, violating the assumption of normality. Secondly, after submitting the data to the F-maximum test suggested by Bruning and Kintz (1968), it was apparent that the homogeneity of variance assumption could not be met.

The decision was made to use the t and F statistics to analyze the data, however, after reviewing research completed by C. Alan Boneau. After repeatedly and deliberately violating a number of assumptions underlying the t-test (including normality and homogeneity) and finding that such violations produced a minimal effect, Boneau concluded that "the t-test is a remarkably 'robust' test in the technical sense of the word" (Boneau, 1960: 61). In other words, it is a statistical test which is only inconsequentially affected by a violation of the underlying assumptions. Since the t and F tests are intimately related, Boneau concluded that "many of the statements referring to the t-test can be generalized quite readily to the F test" (1960:63). Boneau found, specifically, that when performing analyses on samples of equal sizes, both the t and F tests will accommodate departures from normality and homogeneity of variance at the .05 probability level.

After reviewing the strengths and weaknesses of the statistical options available for analyzing the data and testing the research hypotheses, the following decisions were made. For H_1 , that the rates of attendance in the experimental schools ($Ex_1 + Ex_2$) will be higher after treatment than the rates of attendance in the control

schools (C), a matched-pairs (or related measures) t-test was applied. This particular test takes advantage of the matching factor to reduce the standard error and to increase the precision of the analysis. The decision was to test at the .01 level of significance to increase the rigor of the test.

H₂ stated that, after treatment, the rates of attendance among students receiving computer calls will be higher than the rates of attendance among students receiving personal calls or no calls. A one-way analysis of variance was applied to the data to determine if there were significant differences between the three groups which might be attributed to the treatment(s). When a significant F ratio was obtained at the .01 confidence level, a post-hoc test was applied to determine where differences were significant. A Scheffe test for multiple comparisons was selected as the post-hoc procedure to use in this instance as it is recognized as the most conservative of the multiple comparison techniques (Gay, 1976:255).

Finally, to test H₃, H₄ and H₅, that there will be statistically significant differential effects on the attendance of students with low, moderate and high rates of absenteeism as a result of their receiving notification calls by computer, personnel, or no calls, contingency tables were created and the non-parametric chi-square procedure was used to test the hypothesis of no relationship between the variables. When a significant relationship was indicated at the .01 level, the Z-test of proportions described by Bruning and

Kintz (1968: 199-201) was used to test the significance of differences between specific cells of the contingency tables where variables of interest were compared.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

I. INTRODUCTION

The major purpose of this study was to provide answers to the following research questions:

Question 1. Will pupil attendance improve as a result of providing parents with timely and regular notification when their children are absent from school?

Question 2. Will computerized telephone messages to parents be more effective than personal calls, or no calls, in improving pupil attendance?

Question 3. Will computerized and/or personal telephone messages differentially affect the attendance of students with high, moderate and low rates of absenteeism?

Question 4. Will the use of telephone computers be received by the public as acceptable modes of communication between home and school?

Question 5. Are computerized telephone systems cost-effective alternatives for use in combating pupil absenteeism?

In order to answer the first three questions, hypotheses were developed, stated in their null forms and subjected to statistical analysis. The first question addressed in this study was addressed by testing the null of the first hypothesis. H_1 proposed that students

in the combined experimental groups, those whose parents received personal calls and computer calls ($Ex_1 + Ex_2$), would exhibit significantly improved school attendance over those students in the control group (C). Tables II, III and IV provide frequency counts which allow for visual inspection of the shifts in attendance which occurred in all three groups between the pretreatment and the posttreatment periods. Table V displays the results of the statistical test of H_1 .

The combined mean for the posttreatment attendance scores of both experimental groups was calculated to be 5.26, whereas the posttreatment mean for the control group was determined to be 8.26. A t-test for independent samples was used to determine if the positive difference in attendance scores exhibited by the experimental groups over the control group was greater than one might expect to occur by chance. In order to reject the null of H_1 , it was necessary to obtain a t-value which exceeded 2.33 (the critical value for a one-tailed test at the 99 percent probability level). As indicated in Table V, the calculated t-value of 8.94 fell well within the critical region necessary to reject the null hypothesis. Subsequently, the decision was to accept the alternative hypothesis that there was a significant improvement in the attendance of students in the combined experimental groups over those in the control group.

The second research question addressed by this study was concerned with whether the use of telephone computers by schools to notify parents when their children were absent would be more effective than personal calls in improving pupil attendance. Hypothesis 2 was

TABLE II
 FREQUENCY DISTRIBUTIONS FOR EXPERIMENTAL GROUP I ATTENDANCE
 BEFORE AND AFTER HUMAN INTERVENTION

Days Absent	Frequency	Percent	Cumulative Percent
<u>B E F O R E</u> ¹			
0	38	6.5	6.5
1	94	16.0	22.4
2	62	10.5	32.9
3	66	11.2	44.1
4	71	12.1	56.2
5	50	8.5	64.7
6	33	5.6	70.3
7	32	5.4	75.7
8	25	4.2	80.0
9	21	3.6	83.5
10	11	1.9	85.4
11	13	2.2	87.6
12	13	2.2	89.8
13	9	1.5	91.3
14	8	1.4	92.7
15	4	.7	93.4
16	4	.7	94.1
17	7	1.2	95.2
18	5	.8	96.1
19	4	.7	96.8
20	4	.7	97.5
21	2	.3	97.8
22	5	.8	98.6
23	3	.5	99.2
24	1	.2	99.3
25	1	.2	99.5
28	2	.3	99.8
31	1	.2	100.0
Total	589	100.0	

TABLE II (CONTINUED)

Days Absent	Frequency	Percent	Cumulative Percent
<u>A F T E R</u> ²			
0	46	7.8	7.8
1	69	11.7	19.5
2	57	9.7	29.2
3	56	9.5	38.7
4	62	10.5	49.2
5	36	6.1	55.3
6	35	5.9	61.3
7	31	5.3	66.6
8	29	4.9	71.5
9	22	3.7	75.2
10	28	4.8	80.0
11	25	4.2	84.2
12	5	.8	85.1
13	12	2.0	87.1
14	12	2.0	89.1
15	3	.5	89.6
16	8	1.4	91.0
17	7	1.2	92.2
18	5	.8	93.0
19	2	.3	93.4
20	6	1.0	94.4
21	2	.3	94.7
22	5	.8	95.6
23	8	1.4	96.9
24	3	.5	97.5
25	1	.2	97.6
26	2	.3	98.0
27	1	.2	98.1
28	4	.7	98.8
30	2	.3	99.2
31	1	.2	99.3
36	1	.2	99.5
38	1	.2	99.7
41	1	.2	99.8
48	1	.2	100.0

¹Mean = 5.509, Mode = 1.00, Median = 4.000, Standard Deviation = 5.276, and Variance = 27.832.

²Mean = 6.779, Mode = 1.00, Median = 5.000, Standard Deviation = 6.782, and Variance = 45.992.

TABLE III

FREQUENCY DISTRIBUTIONS FOR EXPERIMENTAL GROUP II ATTENDANCE
BEFORE AND AFTER COMPUTER INTERVENTION

Days Absent	Frequency	Percent	Cumulative Percent
<u>B E F O R E</u> ¹			
0	38	6.5	6.5
1	94	16.0	22.4
2	62	10.5	32.9
3	66	11.2	44.1
4	71	12.1	56.2
5	50	8.5	64.7
6	33	5.6	70.3
7	32	5.4	76.7
8	25	4.2	80.2
9	21	3.6	83.5
10	11	1.9	85.4
11	13	2.2	87.6
12	13	2.2	89.8
13	9	1.5	91.3
14	8	1.4	92.7
15	4	.7	93.4
16	4	.7	94.1
17	7	1.2	95.2
18	5	.8	96.1
19	4	.7	96.8
20	4	.7	97.5
21	2	.3	97.8
22	5	.8	98.6
23	3	.5	99.2
24	1	.2	99.3
25	1	.2	99.5
28	2	.3	99.8
31	1	.2	100.0
Total	589	100.0	

TABLE III (CONTINUED)

Days Absent	Frequency	Percent	Cumulative Percent
<u>A F T E R</u> ²			
0	118	20.0	20.0
1	115	19.5	39.6
2	86	14.6	54.2
3	68	11.5	65.7
4	45	7.6	73.3
5	28	4.8	78.1
6	22	3.7	81.8
7	21	3.6	85.4
8	15	2.5	87.9
9	12	2.0	90.0
10	11	1.9	91.9
11	9	1.5	93.4
12	5	.8	94.2
13	3	.5	94.7
14	7	1.2	95.9
15	6	1.0	96.9
16	2	.3	97.3
17	3	.5	97.8
18	2	.3	98.1
19	2	.3	98.5
20	2	.3	98.8
21	1	.2	99.0
22	1	.2	99.2
24	1	.2	99.3
26	1	.2	99.5
28	1	.2	99.7
32	1	.2	99.8
36	1	.2	100.0
Total	589	100.0	

¹Mean = 5.509, Mode = 1.000, Median = 4.000, Standard Deviation = 5.276, and Variance = 27.832.

²Mean = 3.375, Mode = .000, Median = 2.000, Standard Deviation = 4.700, and Variance = 22.100.

TABLE IV
 FREQUENCY DISTRIBUTIONS FOR CONTROL GROUP ATTENDANCE
 BEFORE AND AFTER TREATMENT PERIOD

Days Absent	Frequency	Percent	Cumulative Percent
<u>B E F O R E</u> ¹			
0	38	6.5	6.5
1	94	16.0	22.4
2	62	10.5	32.9
3	86	11.2	44.1
4	71	12.1	56.2
5	50	8.5	64.7
6	33	5.6	70.3
7	32	5.4	75.7
8	25	4.2	80.0
9	21	3.6	83.5
10	11	1.9	85.4
11	13	2.2	87.6
12	13	2.2	89.8
13	9	1.5	91.3
14	8	1.4	92.7
15	4	.7	93.4
16	4	.7	94.1
17	7	1.2	95.2
18	5	.8	96.1
19	4	.7	98.6
20	4	.7	97.5
21	2	.3	97.8
22	5	.8	98.6
23	3	.5	99.2
24	1	.2	99.3
25	1	.2	99.5
28	2	.3	99.8
31	1	.2	100.0
Total	589	100.0	

TABLE IV (CONTINUED)

Days Absent	Frequency	Percent	Cumulative Percent
<u>A F T E R²</u>			
0	35	5.9	5.9
1	38	6.5	12.4
2	44	7.5	19.9
3	57	11.4	31.2
4	49	8.3	39.6
5	53	9.0	48.6
6	42	7.1	55.7
7	33	5.6	61.3
8	28	4.8	66.0
9	28	4.8	70.8
10	17	2.9	73.7
11	17	2.9	76.6
12	16	2.7	79.3
13	16	2.7	82.0
14	12	2.0	84.0
15	13	2.2	86.2
16	7	1.2	87.4
17	8	1.4	88.8
18	6	1.0	89.8
19	1	.2	90.0
20	8	1.4	91.3
21	5	.8	92.2
22	5	.8	93.0
23	3	.5	93.5
24	5	.8	94.4
25	3	.5	94.9
26	3	.5	95.4
27	6	1.0	96.4
28	3	.5	96.9
29	2	.3	97.3
30	1	.2	97.5
31	1	.2	97.6
32	1	.2	97.8
34	3	.5	98.3
35	3	.5	98.5
36	2	.3	98.8
37	1	.2	99.0
38	1	.2	99.2
40	1	.2	99.3

TABLE IV (CONTINUED)

Days Absent	Frequency	Percent	Cumulative Percent
43	1	.3	99.5
45	2	.3	99.8
51	1	.2	100.0
Total	589	100.0	

¹Mean = 5.509, Mode = 1.000, Median = 4.000, Standard Deviation = 5.276, and Variance = 27.832.

²Mean = 8.258, Mode = 3.000, Median = 6.000, Standard Deviation = 8.048, and Variance = 64.770.

TABLE V
COMPARISON OF POSTTREATMENT ATTENDANCE MEANS FOR
EXPERIMENTAL VERSUS CONTROL GROUPS

Group	Number of Cases	Mean	Standard Deviation	Degrees of Freedom	t-Value
Received Calls (Ex ₁ + Ex ₂)	1178	5.26	5.83	1176	8.94*
Received No Calls (C)	589	8.26	8.05	588	

*Indicates significant difference at .01 level; t-value of 2.33 necessary to reject null hypothesis.

developed to determine if the attendance of students whose parents received computer calls would be better than that of students whose parents received personal calls or no calls.

Figure I graphically depicts the changes in attendance behavior of those students whose homes received personal (Ex_1), computerized (Ex_2) or no calls (C) during the 60 days of treatment. Since students in each group were identically matched on their school attendance during the 60 days prior to any intervention, each group began with a mean of 5.51 absences. Examination of Figure 1 indicates that, as a group, students receiving calls made by telephone computer experienced a reduction in absenteeism (down to 3.74) while those in groups receiving personal calls and no calls exhibited increased absenteeism during the experimental period (up to 6.78 for the former and 8.26 for the latter).

A one way ANOVA technique was used to determine if the differences observed between the three groups were statistically significant at the .01 level. Table VI records the results of the F-test. A minimum F-value of 4.6 was needed in order to claim that the differences between the group means were due to the treatment rather than to chance or error. An exceptionally large F of 70.7 was calculated; thus, the null hypothesis was rejected and a significant change attributable to the treatment was found.

Since the F ratio indicated the existence of a significant difference among the posttreatment attendance means of the three groups under study, the next step was to determine which of the groups were significantly different from the other(s). The conservative Scheffe's

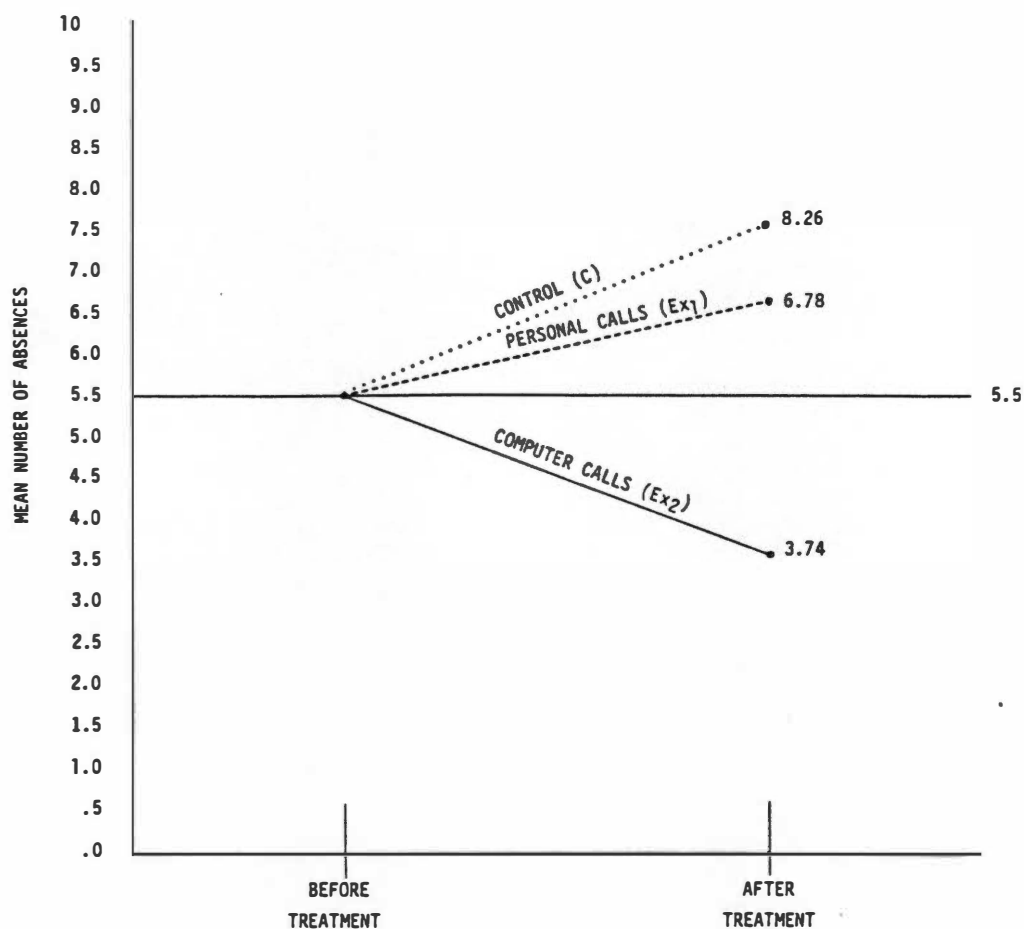


Figure 1. Comparison of Mean Change in Attendance Between Experimental Groups and Control Group Before and After Treatment.

TABLE VI
ANALYSIS OF VARIANCE FOR EXPERIMENTAL GROUP I VERSUS
EXPERIMENTAL GROUP II VERSUS CONTROL GROUP

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-Value
Between Groups	6,265.0741	2	3132.5371	70.7322*
Within Groups	78,122.7640	1764	44.2873	
Total	84,387.8381	1766		

*Indicates significant difference at .01 level; F-value of 4.6 necessary for significance.

test for multiple comparisons was applied to the data and the results are recorded in Table VII.

The results of the Scheffe provided statistical support for the conclusion that the posttreatment attendance mean of the computer group (3.74) was significantly different from both that of the group receiving personal calls (6.78) and the control group (8.26). Furthermore, the mean of the former group was significantly different than that of the control group. Thus, analysis of the data presented above suggested that computerized telephone messages to parents were more effective than personal calls in improving pupil attendance while the latter was more effective than no calls.

Having examined questions related to (1) the impact of parental notification on pupil absenteeism and (2) the effect of alternative methods of providing notification, a third question addressed by the present study was whether students with varying patterns of absenteeism would respond differently to the methods of notification discussed above. To answer this question, the null of the following hypotheses was tested:

H₃. There will be a statistically significant differential effect on the attendance of students with low rates of absenteeism as a result of their receiving computer calls, personal calls or no calls.

H₄. There will be a statistically significant differential effect on the attendance of students with moderate rates of absenteeism as a result of their receiving computer calls, personal calls or no calls.

TABLE VII
SCHEFFÉ'S TEST FOR MULTIPLE COMPARISONS FOR
EXPERIMENTAL AND CONTROL GROUPS

Mean	Group	Ex ₂	Ex ₁	C
3.7351	Computer Calls (Ex ₂)			
6.7793	Personal Calls (Ex ₁)	*		
8.2581	Control (C)	*	*	

*Denotes pairs of groups significantly different at the .01 level.

H₅. There will be a statistically significant differential effect on the attendance of students with high rates of absenteeism as a result of their receiving computer calls, personal calls or no calls.

It is important to recall that all students in this study were subgrouped on their attendance records during a 60 day period prior to implementing notification of absence calls to their homes. Students experiencing no more than one absence during this period were considered to have a low rate of absenteeism while those experiencing 2 to 5 absences and those accumulating more than 6 were considered to have experienced moderate and high rates of absenteeism respectively. The cross-tabulations by treatment groups provided in Figure 2 show the number and percent of students who fell into these three categories both before and after intervention. Close examination of this data indicate that the pretreatment-posttreatment differences in student absenteeism were considerable both within and between the two experimental groups and the control group. Extremely high chi square (χ^2) calculations were obtained for each group, thus, substantiating statistically that the differences between the observed and expected frequencies were greater than one would consider to have occurred by chance.

Although the chi-square calculations for each group demonstrate that significant changes occurred in the attendance of students by category across the experimental period, it cannot be determined that these changes were affected by the independent variables under study without further statistical treatment of the data. The control group

		L O W		M O D E R A T E		H I G H		T O T A L	
		Number & Percent		Number & Percent		Number & Percent		Number & Percent	
B E F O R E	EXPERIMENTAL GROUP I (PERSONAL CALLS) - $\chi^2 = 228.7^*$								
	A F T E R								
	Low	61	46.2	58	43.9	13	9.8	132	22.4
	Moderate	47	18.9	123	49.4	79	31.7	249	42.3
	High	7	3.4	30	14.4	171	82.2	208	35.3

Total		115	19.5	211	35.8	263	44.7	589	100.0
B E F O R E	EXPERIMENTAL GROUP II (COMPUTER CALLS) - $\chi^2 = 145.9^*$								
	A F T E R								
	Low	90	68.2	39	29.5	3	2.3	132	22.4
	Moderate	112	45.0	104	41.8	33	13.3	249	42.3
	High	31	14.9	84	40.4	93	44.7	208	35.3

Total		233	39.6	227	38.5	129	21.9	589	100.0
B E F O R E	CONTROL GROUP (NO CALLS) - $\chi^2 = 154.4^*$								
	A F T E R								
	Low	27	20.5	83	62.9	22	16.7	132	22.4
	Moderate	37	14.9	104	41.8	108	43.4	249	42.3
	High	9	4.3	26	12.5	173	83.2	208	35.3

Total		73	12.4	213	36.2	303	51.4	589	100.0

*Indicates significant chi-square (χ^2) at .01 level.

Figure 2. Cross-Tabulations Showing Pretreatment-Posttreatment Changes in Absenteeism Among Students in the Experimental and Control Group.

is a case in point. It produced a large and significant chi square despite the fact that no treatment was applied to the students in the group.

In order to test H_3 , H_4 and H_5 , the decision was made to create frequency tables which compared the changes in absenteeism by treatment groups of all students in each attendance category (low, moderate and high) according to whether their attendance improved, remained unchanged or worsened during the experimental period. A chi-square test was administered to each set of data to determine if significant differences existed among the students in each category. When significant chi square statistics were calculated, a Z-test of proportions was used to determine which treatments produced significantly different results in the direction desired.

Table VIII records the effects of the treatments upon students in each attendance category. Since the researcher was primarily interested in producing a positive change in pupil attendance, any differences in the "unchanged" or "improved" columns were subjected to significance tests. The results of these Z-tests are recorded in Table IX.

Hypothesis 3 may be addressed by examining the first set of data presented in Table VIII. From a sample of 396 students (132 in each experimental group) whose pretreatment attendance scores placed them in the low absenteeism category, 90 (86 percent) from the computer group, 61 (46 percent) from the personal group, and 27 (20 percent) from the control group maintained their high rates of attendance over the 60 day treatment period. Since none of the students in this group

TABLE VIII
EFFECT OF TREATMENTS UPON STUDENTS WITH LOW¹, MODERATE², AND
HIGH³ RATES OF ABSENTEEISM

Treatment Calls/No Calls	Attendance Status						Total
	Improved		Unchanged		Worsened		
	Number	Percent	Number	Percent	Number	Percent	
<u>LOW</u>							
Personal (Ex ₁)			61	46	71	54	132
Computer (Ex ₂)			90	68	42	32	132
No Calls (C)			27	20	105	80	132
Total			178		218		396
<u>MODERATE</u>							
Personal (Ex ₁)	47	19	123	49	79	32	249
Computer (Ex ₂)	112	45	104	42	33	13	249
No Calls (C)	37	15	104	42	108	43	249
Total	196		331		220		747
<u>HIGH</u>							
Personal (Ex ₁)	37	18	171	82			208
Computer (Ex ₂)	115	55	93	45			208
Control (C)	35	17	173	83			208
Total	187		437				624

¹ χ^2 = 60.59 (significant at 99 percent probability level).

² χ^2 = 92.0 (significant at 99 percent probability level).

³ χ^2 = 95.4 (significant at 99 percent probability level).

TABLE IX
COMPARISON OF STUDENTS FROM LOW, MODERATE AND HIGH ABSENTEEISM CATEGORIES
WHOSE ATTENDANCE IMPROVED^a AFTER TREATMENT

Group	Low	Z-Scores	Moderate	Z-Scores	High	Z-Scores
Computer Calls (Ex ₂)	90		112		115	
Z Scores for Ex ₂ vs. Ex ₁		3.49*		5.43*		8.15*
Personal Calls (Ex ₁)	61		47		37	
Z Scores for Ex ₁ vs. C		5.39*		1.14		.30
No Calls (C)	27		37		35	

^aStudents in the "Low" category could not further reduce their absenteeism; thus, the desired effect was that their attendance would remain unchanged (0 or 1 day absent out of 60).

*Indicates significance at the .01 level. A Z-Score of at least 2.58 is necessary to establish a significant difference between proportions at the 99 percent level.

could further reduce their absenteeism by definition of the category limits, their attendance could only remain unchanged (which was the desired effect) or worsen.

The calculated chi square of 60.59 far exceeded the 10.60 table value necessary to reject the null hypothesis of homogeneity at the .01 level. This large chi square indicates that the differences resulting between the three groups of low absentees were significant; furthermore, the Z scores calculated and recorded in Table IX demonstrate that the pupils in the low category who received computer calls exhibited significantly better performance on attendance than those who received personal calls, while both groups performed significantly better than the control group.

The same method of analysis was used to examine H_4 and H_5 . The second set of data presented in Table VIII records by number and percent the posttreatment attendance status of students who experienced a moderate rate of absenteeism during the pretreatment period. As in the previous case, a large chi-square (92.0) was calculated, providing statistical evidence that a significant difference also existed between the number of students in this category whose attendance improved, remained unchanged or worsened. Thus, the null hypothesis was rejected.

It is clear from the data in Table IX that students in the moderate category who received computer calls demonstrated significant improvement in attendance over those in the other two groups. The number of students in the group receiving calls from personnel who demonstrated improved attendance after treatment (47), however, was not

significantly greater than those in the control group (37). Although the former group outnumbered the latter by ten students in the "improved" column, the difference was not great enough to attribute to the treatment.

Analysis of the posttreatment data for students experiencing high rates of pretreatment absenteeism produced results similar to those for the moderate group. While a large computed chi square of 95.4 allowed rejection of the null of H_5 , only students in the group receiving computer calls demonstrated improved attendance in numbers great enough to claim significance at the .01 level. The third data set in Table VIII provides the posttreatment attendance status of the 208 students who experienced 6 or more days of absence from school prior to receiving treatment. As with the first set of data in this table, only two attendance categories are indicated. Since students with high rates of pretreatment absenteeism could not, by definition, move into a worse attendance category, there are no students represented in that column.

By examining the "high" column in Table IX, it is apparent that, among students with the poorest attendance, the ones in the computer called group responded behaviorally much better than those in group receiving personal calls or the control group. In fact, with this particular group of students, it appears that calls by personnel were no more effective than no calls in improving attendance.

Next, the data were combined for the purpose of displaying the posttreatment attendance status (by experimental group) of all 1,767 students in the study who were matched on their pretreatment

absenteeism. Table X provides a comparison of these students by treatment group according to whether their attendance improved, remained unchanged or worsened during intervention. Again, Z-tests of proportions were calculated in order to determine where significant differences among treatments existed. Figure 3 presents the same data in graphic form.

Using Table X to support statistically the visual comparison of the treatment effects presented in Figure 3, it is immediately obvious that experimental group II produced the most significant and positive results. Not only did the students receiving computerized calls achieve the greatest percentage of improved attendance, but they also had the fewest number of participants whose attendance worsened. Inspection of the Z-scores provided in the table reveals that, in both categories, the differences between this group and treatment group I (which produced the next most desirable results) were significant at the 0.1 level.

Finally, while the students receiving personal notification calls demonstrated only a slight difference in improved attendance over the control group, this group did have significantly fewer students than the latter whose attendance became worse. When one considers (1) the extent to which absenteeism throughout the school system under study increased during the experimental period, as evidenced by the behavior of the control group (see Figure 1, page 63), and, considering (2) that group I had the greatest number of students whose attendance remained unchanged as well as (3) a statistically significant fewer participants than the control group whose attendance worsened, it seems

TABLE X
COMPARISON BY TREATMENT GROUP OF ALL STUDENTS WHOSE ATTENDANCE
IMPROVED, REMAINED UNCHANGED OR WORSENED AFTER INTERVENTION

Treatments (Calls/No Calls)	Improved		Z-Scores	Unchanged		Worsened		Z-Scores	Total
	Number	Percent		Number	Percent	Number	Percent		
Computer Calls (Ex_2)	227	38.5		287	48.7	75	12.7		589
Z-Scores for Ex_2 vs. Ex_1			9.42*					5.56*	
Personal Calls (Ex_1)	84	14.3		355	60.3	150	25.5		589
Z-Scores for Ex_1 vs. C			1.06					3.93*	
No Calls (C)	72	12.2		304	51.6	213	36.2		589
Total	383	21.6		946	53.5	438	24.7		1767

*Indicates significant Z-scores at .01 probability level; Z-value of 2.58 necessary to assume significance.

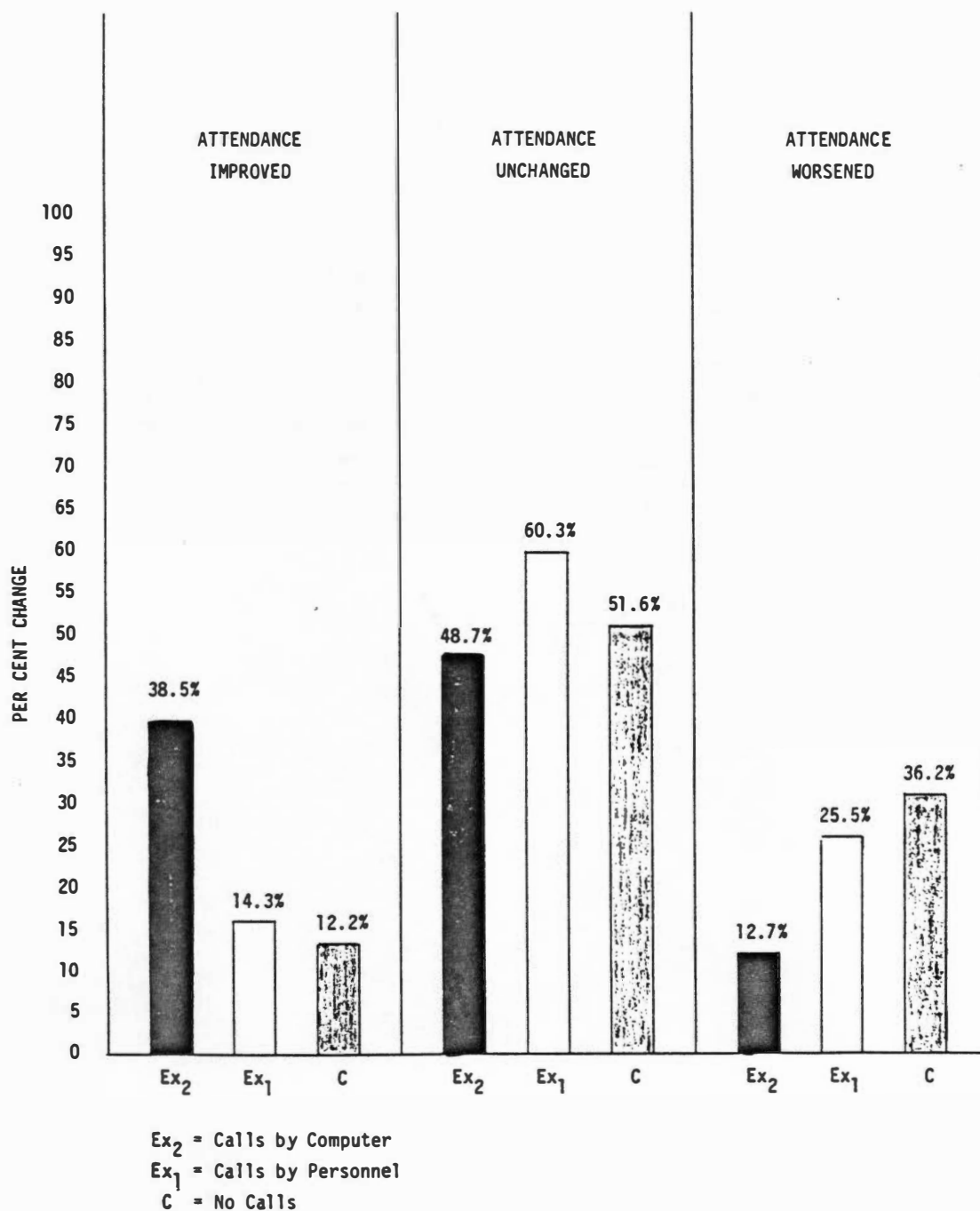


Figure 3. Percent of Students (by Group) Whose Attendance Improved, Remained Unchanged and Worsened During Treatment Period.

safe to suggest that the treatment had a positive impact in that it slowed the rate of absenteeism. This issue will be discussed further in Chapter V.

The fourth research question which this study addressed was whether the use of telephone computers would be received by the public as acceptable modes of communication between home and school. This question is an important one because the public school system cannot afford to alienate the general public by moving in a direction which the majority oppose. Thus, a short telephone survey with a sample of parents ($n=375$) who received computerized notification calls when their children were absent from school was conducted. The results of the survey are summarized in Table XI.

One of the most obvious drawbacks to using a telephone computer to report absenteeism to the homes of students is that one cannot be certain that the call will be answered by a parent. Questions 1 and 2 were designed to determine how often these notification calls were received by parents. The responses to these two questions indicate that at least 70 percent of the parents interviewed were aware that their homes were called each time their child was in non-attendance; and, they remembered answering these calls. When the number of parents who remember receiving some, if not all, of the calls made are added (Question 2), it became reasonable to assume that between 70 and 86 percent of the calls made by computer were answered by a parent.

Although only 59 percent of those interviewed expressed with certainty the belief that the notification calls received made a positive difference in their child's attendance, many more confided in

TABLE XI
SURVEY OF PARENT ATTITUDES TOWARD THE USE OF TELEPHONE
COMPUTERS BY SCHOOL PERSONNEL

Question		Response	Number	Percent
^a 1	Do you remember receiving computerized telephone messages during the past school year notifying you when your child was absent from school? (Answer Yes or No)	Yes	322	86
		No	53	14
^a 2	Were you aware that a computerized call was made from the school to your home each time your child was absent? (Answer Yes or No)	Yes	262	70
		No	113	30
^a 3	Do you think that your child's attendance was better as a result of his/her awareness that these calls were being made? (Answer Yes, No or No Opinion)	Yes	221	59
		No	87	23
		No Opinion	67	18
^a 4	Do you favor or object to the use of telephone computers by school personnel for reporting daily student absenteeism to parents? (Answer Favor, Object To or No Opinion)	Favor	321	86
		Object To	35	9
		No Opinion	19	5
^b 5	If it could be demonstrated that the use of telephone computers are as efficient and less expensive than the use of personnel to report daily absenteeism would you favor or object to their use for this purpose? (Answer Favor, Object To or No Opinion)	Favor	24	44
		Object To	21	39
		No Opinion	9	17
6	Total after addressing Question 5 to 54 participants who "Objected To" or had "No Opinion" on Question 4.	Favor	345	92
		Object To	21	6
		No Opinion	9	2

^an=375

^bn=34 (question was asked only to those parents who answered "Objected To" or had "No Opinion" on Question 4.

the interviewer that they appreciated being kept informed and that the schools should assume this responsibility. Another 18 percent of the respondents were undecided as to the impact of the calls. Finally, the responses to questions 4 and 5 indicated that an exceptionally high percentage of parents (86 percent) favored the use of telephone computers to provide notification of pupil absenteeism. This number increased to 92 percent when those parents are added who would support the use of computers provided that their cost effectiveness could be documented.

The issue of cost-effectiveness was the area of concern addressed by the last research question. Jin Eun Kim (1979:3) suggests that a cost-effectiveness and/or benefit analysis is a valuable analytical technique "for assessing the outputs of educational programs in relation to their specified program objectives and against the costs of those programs." Application of Kim's definition to the present study required comparing the costs of using personnel and telephone computers against the benefits which were derived.

The performance of the two experimental methods on their rates of "successful" home contacts is compared in Table XII. By examining the rows labeled "Group Total" for the two groups and using the percentage figures, one can compare the treatments despite the large difference in the numbers of calls completed.

Eleven percent of the calls completed by attendance personnel during school hours were answered by children where no adult was in the home at the time of the call. Although this was not the kind of home contact preferred, calls answered by children (11 percent) must be

TABLE XII
COMPARISON OF CALLING RESULTS BY PERSONNEL (Ex_1) AND COMPUTER (Ex_2)

Group	Calls Attempted		Calls Completed To Adults		Calls Completed To Children		Calls Completed To Adults and/or Children		Calls Unanswered (No Answer or Busy After Three Tries)		Calls/Bad Numbers	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<u>EXPERIMENTAL GROUP I (Personnel)</u>												
School X	488		180	38.8	67	13.7	247	50.6	172	35.3	69	14.1
School Y	783		253	32.3	106	13.5	359	45.8	308	39.4	116	14.8
School Z	1066		407	38.2	85	8.0	492	46.2	448	42.3	126	11.8

Group Total	2337		840	35.9	258	11.0	1098	46.9	928	39.7	311	13.3
<u>EXPERIMENTAL GROUP II (Computer)</u>												
School A	5560						4866	87.5	420	7.6	274	5.0
School B	3001						2708	90.2	122	4.1	171	5.7
School C	5043						4304	85.3	304	6.0	436	8.6

Group Total	13604						11878	87.3	846	6.3	881	6.5

combined with calls answered by adults (35.9 percent) for comparison purposes because it was impossible to determine which of the evening calls completed by computer were answered by adults. The computer, therefore, completed 87.3 percent of the calls attempted during the period of intervention, while personnel completed 46.9 percent, a positive difference of more than 40 percent for the former treatment.

The computer not only produced a higher percentage of completed calls to the homes of absent students, but it also completed its task more efficiently if time required to complete each call is used as the primary criterion for determining efficiency. Table XIII was created for the purpose of comparing computer calls and personal calls on the time factor. Over the 60 day experimental period, the computer required an average of 2:48:55 per day to complete an average of 198 out of 227 calls. Attendance personnel, on the other hand, required an average of 2:30:36 per day to complete 18 of 39 calls. As the data in Table XIII clearly illustrate, the computer required an average of 42 seconds per call to deliver its message while personnel consumed 3 minutes and 54 seconds to complete a similar task.

An effort was made to attach cost figures to the result and time factors discussed above. Using salary and fringe benefit formulas provided by the personnel department of the school system in which the study was conducted, it was possible to compute and record in Table XIV a cost estimate per call for the computer and school personnel and to project this estimate for a full school term of 180 instructional days. As the final line in Table XIV indicates, the cost for completing a call to the home of an absent student was estimated at \$.15 per call

TABLE XIII
COMPARISON OF CALLING TIME BY PERSONNEL (Ex_1) AND COMPUTER (Ex_2)

Category	Personnel (Ex_1)	Computer (Ex_2)
Average Number of Calls Attempted/Per Day	39	227
Average Number of Calls Answered	18	198
Average Time Consumed Making Daily Calls	2:30:36	2:48:55
Average Time Required Per Call	0:03:54	0:00:42

TABLE XIV
COMPARISON OF COSTS BY PERSONNEL (Ex_1) AND COMPUTER
(Ex_2) FOR REQUIRED CALLING TIME

Cost Category	Personnel (Ex_1)	Computer (Ex_2)
Salary and Fringe Benefits (@ \$4.88/hour plus 25%) for one day	\$ 137.25*	\$ 45.75**
Salary and Fringe Benefits for Calling Time (for one day)	\$ 45.75 ^a	\$ 2.50 ^b
Salary and Fringe Benefits for Calling Time (for 60 days)	\$2,2745.00	\$ 150.00
Cost for Hardware, Supplies and Materials (for 60 days)	--	\$4,587.00 ^c
Total Cost Per Call Attempted	\$ 1.50	\$.35
Total Cost Per Call Answered (for 60 days)	\$ 2.50	\$.40
Total Cost Per Call Attempted	\$ 1.17	\$.13
Total Cost Per Call Answered Projected Over the School Year (180 days)	\$ 2.50 ^d	\$.15 ^d

*Figure based on salary for three employees working a 7.5 hour day.

**Figure based on salary for one employee to operate computer.

^aFigure based on 2.5 hours (average time required for calling).

^bFigure based on .41 hours (average time required to operate computer).

^cFigure represents one time investment in computer (\$4,500) plus print paper and special tapes required to operate for 60 days.

^dFigure derived by projecting 60 day results/time/cost factors over 180 days.

for the computer and \$2.50 per call for school personnel. When one considers that the initial investment for computer hardware will not be incurred on an annual basis, and, that the cost of employing personnel will likely increase each year, the cost differential per call between the computer and the employee will increase for as long as the computer operates without major repairs or replacement.

In order to draw a more concrete cost-performance comparison between the use of a person versus the use of a telephone computer for notification purposes, the data collected may be used to develop some close approximations of potential savings which a school system might incur over an extended period of time. Some assumptions must be made, however, prior to calculating long-term expenditures and savings. Assuming, for example, that the average telephone computer would have a life of only three years and that personnel costs would remain constant over the same time period, data in Table XV may be used to estimate what a school system might be required to invest in the use of these two options to improve pupil attendance.

Obviously, if notification to parents is the primary program objective, the use of computers over three years would require less than one-third of the investment necessary to employ personnel for the same purpose (\$8,811 for the former and \$27,750 for the latter). However, the other side of the cost effectiveness equation--benefits--is equally important. Changes in attendance were converted into dollars gained or lost (see Table XVI). The school system in which this study was conducted received annual reimbursement funds based on the best two of the first three months' Average Daily Attendance (ADA)

TABLE XV
COMPARISON OF PERSONNEL AND COMPUTER COST ESTIMATES
AMORTIZED OVER ONE AND THREE YEARS

Cost Category	Personnel	Computer
Salary and Fringe Benefits (@ \$4.88/hour plus 25%) for one clerical position for one day	\$ 45.75	\$ 2.50 ^a
Salary and Fringe Benefits for one clerical position (200 day payroll schedule) for 1 year	\$ 9,150.00	\$1,350.00 ^b
Computer Hardware (initial cost)	-	\$4,500.00
Material and Supplies (for 1 year)	\$ 100.00	\$ 87.00

Total First Year Costs for Personnel, Equipment and Supplies	\$ 9,250.00	\$5,937.00

Cost for Personnel, Equipment and Supplied Amortized Over 3 Years	\$27,750.00 ^c	\$8,811.00 ^d

^aThis figure is based on .41 hours (estimate of time required to load and program computer).

^bThis figure is based on the use of the computer for 180 instructional days per year.

^cThis figure is based on the assumption of no change in personnel costs.

^dThis figure is based on the assumption that the computer will last at least 3 years without major repair or replacement.

TABLE XVI
COMPARISON OF POTENTIAL GAINS/LOSSES IN STATE
REIMBURSEMENT FUNDS (ADA) BY GROUP

Type of Reimbursement	No Calls \$ (n=589)	Personal Calls \$ (n=589)	Computer Calls \$ (n=589)
State Reimbursement @ \$3.54 Per Pupil Per Day for 589 Students (for 60 days)	\$125,104.00	\$125,104.00	\$125,104.00
State Reimbursement Funds Lost During 60 Day Pretreatment Period	\$ 11,468.00	\$ 11,468.00	\$ 11,468.00
Mean Absentee Rate	5.5	5.5	5.5
State Reimbursement Funds Lost During 60 Day Treatment Period	\$ 17,233.00	\$ 14,137.00	\$ 7,798.00
Mean Absentee Rate	8.26	6.78	3.74
Net Gain (+) or Loss (-) In Reimbursement Funds After Treatment	\$ -5,755.00	\$ -2,669.00	\$ +3,670.00

figures computed at the beginning of each school year. For 1984-85, the schools received an estimated \$3.54 per student for each day of attendance (Taylor, 1986).

Assuming that the attendance rates of freshman and sophomore students in the present study were representative of the entire school system and that the treatment period had coincided with the time of the year during which the local ADA was computed, it was possible to calculate the amount of state reimbursement funds which the school system would have stood to gain or lose given the treatment effects which resulted. Table XVI provides, by treatment group, a summary of the impact in dollars which the changes in attendance among the three groups would have produced during the period under investigation.

During the 60 day pretreatment period, attendance among ninth and tenth grade students across the school district (as indicated by the performance of the control group) was running at approximately 91 percent (5.5 absences per student). This 9 percent rate of absenteeism would have cost the district an estimated \$11,468 in ADA money. However, during the following 60 days (the treatment period) the rate of attendance dropped to approximately 86.3 percent, resulting in a potential additional loss of \$17,223. During the same period, the students who received notification calls placed by personnel suffered a less drastic drop in attendance to 88.7 percent, but still would have cost the district an additional \$14,137. Only students receiving computerized notification calls experienced a decline in absenteeism. The attendance rate of the latter group climbed to 93.8 percent (3.74

absences per student) and would have resulted in a savings of approximately \$3,670 from the first 60 days to the second.

A simple cost/benefit comparison is made in Table XVII between the three alternatives examined in this study. If the school system had used a telephone computer to combat absenteeism among freshmen and sophomores during the experimental periods, it would have invested approximately \$1,979 in personnel, supplies and hardware while receiving an increase of \$3,670 in ADA money; thus, it would have realized a net tangible benefit of \$1,691. Had the district chosen, instead, to hire classified personnel to perform the same task, it would have lost \$2,669 in ADA funds; yet, this loss was \$3,086 less than that of the control group. At first glance, it appears that the use of personnel to make notification calls was also a cost-saving strategy. However, as Table XVII illustrates, when the cost of salary, equipment and materials (\$3,083) is added to the loss of ADA money (\$2,669), the attendance position would have cost the district \$5,752 over the 60 day period. On the other hand, had the district chosen to make no effort of any kind to improve pupil attendance, it would have lost \$5,755 in ADA reimbursement, only \$3.00 more than it would have cost to employ an attendance worker.

II. SUMMARY

In summary, the data presented and analyzed in this chapter resulted in the following findings:

TABLE XVII
COMPARISON OF PROJECTED EXPENDITURES INCURRED AND REVENUES
RECEIVED BY SCHOOL SYSTEM DURING INTERVENTION

Expenditure	No Calls (Control)	Personal Calls	Computer Calls
Cost To School System for 60 Days Intervention (salary, equipment, and materials)	-	\$ 3,083.00	\$ 1,979.00*
ADA Funds Lost (-) or Generated (+) for 60 Day Treatment Period	\$ -5,755.00	\$ -2,669.00	\$ +3,670.00
Total Net Cost to School System	\$ -5,755.00	\$ -5,752.00	\$ +1,691.00

*This figure is based on first year expenditures which include the initial cost of telephone computer (\$4,500.00).

1. Students whose parents received notification of absence calls (both computer and personnel groups combined) experienced higher rates of attendance than students whose parents received no calls.

2. Students whose parents received computerized notification of absence calls experienced higher rates of attendance than those whose parents received personal calls or no calls. Students whose parents received personal calls also experienced better attendance than those receiving no calls.

3. The attendance of students with low, moderate and high rates of absenteeism prior to treatment was differentially affected by the methods of calling which were examined. Computer calls produced improved attendance among students in all three categories while personnel calls resulted in significant improvements only in the attendance of students with low rates of pretreatment absenteeism.

4. The use of telephone computers by schools for notification of absence purposes was received by the public as acceptable modes of communication between home and school.

6. Telephone computers were cost-effective and cost-beneficial alternatives for combating pupil attendance problems.

CHAPTER V

SUMMARY AND FINDINGS, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

I. SUMMARY AND FINDINGS

Research supporting a positive correlation between parental notification and improved pupil attendance has been limited, while research regarding the impact and implications of using computerized telecommunications devices to inform parents of their children's absenteeism was virtually non-existent. The primary purpose of this study was to provide educational decisionmakers with sufficient data to determine if the use of telephone computers would be an effective, publicly-acceptable and cost-beneficial alternative to the use of personnel in addressing the problem of student absenteeism.

To give direction to the study, the following research questions were stated:

1. Will pupil attendance improve as a result of providing parents with timely and regular notification when their children are absent from school?
2. Will computerized telephone messages to parents be more effective than personal calls in improving pupil attendance?
3. Will computerized and/or personnel telephone messages differentially affect the attendance of students who are experiencing high, moderate and low rates of absenteeism?

4. Will the use of telephone computers be received by the public as acceptable modes of communication between home and school?

5. Are computerized telephone systems cost-effective alternatives for use in combating pupil absenteeism?

The first three of these questions were addressed by developing five hypotheses and submitting their null forms to statistical tests. All hypotheses were tested at the .01 level of significance. Question 4 was answered by completing a telephone opinion survey with a random sample of parents who had been selected to receive computer calls. Finally, a cost-effectiveness/benefit analysis was performed on selected data in order to address the fifth question.

The sample was composed of 1,767 freshman and sophomore students attending 9 comprehensive high schools located across the selected school district. These students were assigned by schools to two experimental groups and a control group. A matching technique was utilized to place all subjects from both experimental groups and the control group in identical relation to one another on a pretreatment measure of the dependent variable (attendance). After matching, each group contained 589 students, for a total of 1,767. Those in experimental group I received the secondary treatment, notification of absence calls addressed to their parents and completed during school hours by attendance personnel. Group II students received the primary treatment, a similar notification of absence call addressed to their parents but completed in the evening by a telephone computer housed in a central location. Students in the control group received no routine or deliberate calls when they were absent from school.

Data were collected by retrieving (1) personal attendance records for each student in the study from the school system's central computer file, (2) written records maintained by attendance personnel, (3) daily computer printouts generated by the telecommunications device under study, (4) a survey of personal telephone responses from a random selection of parents who received computerized notification calls and (5) salary and state reimbursement figures from the school district's personnel and business offices.

The following is a summary of the procedures utilized and the findings which resulted.

To determine if a significant relationship between parental notification and pupil absenteeism was apparent (Q_1), it was hypothesized that students in the combined experimental groups (those receiving both computerized and personal calls) would demonstrate a significant improvement in attendance over students in the control group (those receiving no calls).

The null hypothesis was rejected and the alternative, that there was a significant difference in attendance between students whose parents received calls and those who received no calls, was accepted.

Question 2 was concerned with whether notification calls completed by telephone computers would be more or less effective than those completed by personnel; thus, it was hypothesized (H_2) that the attendance of students receiving computerized calls would be significantly better after treatment than that of students receiving personnel calls or no calls. Again, the null hypothesis was rejected and it was found that computerized telephone messages to parents were

more effective than calls placed by personnel in improving pupil attendance, while the latter was more effective than no calls.

The third question addressed by the study was concerned with whether students with varying rates of absenteeism would respond differently to the methods of providing parent notification tested above. It was hypothesized that the attendance of students with low (H_3), moderate (H_4) and high (H_5) rates of absenteeism would be differentially affected as a result of their receiving computer calls, personal calls or no calls. Since all students in the study were subgrouped into these three attendance categories on the basis of their absenteeism during the 60 days preceding the implementation of notification calls, contingency tables were created to illustrate the pretreatment to posttreatment changes in attendance which were experienced by students in both experimental groups and the control group.

After testing the hypotheses of no relationship between the variables and then using tests of proportions to determine if the differences between two or more relationships were significant, it was possible to reject the null of H_3 , H_4 and H_5 and the following findings were made:

1. Among students with low rates of absenteeism prior to treatment,

- a. those receiving calls completed by computer improved their attendance in significantly greater numbers than those receiving personal calls or no calls;

b. those receiving calls made by personnel also maintained their low rates of absenteeism in significantly greater numbers than those receiving no calls.

2. Among those students with moderate and high rates of absenteeism prior to treatment,

a. those receiving calls completed by computer improved their attendance in significantly greater numbers than those receiving personal calls or no calls;

b. there was no significant difference in the number of students who improved their attendance between those receiving personal calls and those receiving no calls.

3. Among all students in the study, those receiving computer calls demonstrated improved attendance in significantly greater numbers and worsened attendance in significantly fewer numbers than those receiving personal calls and no calls.

4. Among all students in the study, while there was no significant difference between the number of students receiving personal calls who improved their attendance over those receiving no calls, a significantly fewer number of those receiving personal calls experienced worse attendance.

Question 4 addressed the issue of public acceptance of telephone computers as viable means of communication between home and school. A sample of 375 parents were randomly selected from the group receiving computerized notification calls to participate in the telephone survey. The data collected support the following findings:

1. Most of the notification calls (over 70 percent) placed to the homes of absent students in the evening were received by parents.

2. A majority of parents surveyed (59 percent) believed that daily notification of absence calls resulted in improved attendance on the part of their children.

3. An overwhelming majority of parents (more than 86 percent) favored the use of telephone computers by school personnel for reporting daily pupil absenteeism, especially upon documenting cost-effectiveness.

The final question which this study sought to answer was whether computerized telephone systems were cost-effective alternatives for use in improving pupil attendance. A cost effectiveness/benefit analysis was performed upon the data and resulted in the following determinations:

1. The telephone computer produced over 50 percent more successful home contacts than personnel while requiring one-fifth as much time to complete a call.

2. On a cost per call basis, personnel were more than 16 times as expensive to use as the computer. This difference could be expected to increase until major repair or replacement of the computer was necessary.

3. Over a three year period, a school district could expect to invest more than three times as many dollars in using a person for attendance notification purposes than would be required by a telephone computer.

4. The telephone computer would generate enough ADA (average daily attendance) dollars to pay for itself in less than one-third of a school year while personnel would barely break even.

II. DISCUSSION

One of the major assumptions around which this study was designed is that if parents are provided with early notification when their children are absent from school, those who are unaware of the absenteeism can take corrective action which will, in many cases, prevent unauthorized absences from reoccurring in the future. The literature suggests that from one-third to one-half of the children reported absent on any given day are truant (Tennent, 1971:16). Thus, if the assumption stated above is sound, school districts should be able to make considerable progress in increasing rates of pupil attendance by establishing, or improving, methods of parental notification.

Since research establishing a strong correlation between parental awareness and improved pupil attendance behavior was found to be limited to just a few studies, one of the primary purposes of the project was to determine if data could be collected which would support this relationship. Consequently, the researcher hypothesized first (H_1) that any method of providing regular and timely (same day) notification to the parents of absent students would affect a positive change in the latter's attendance behavior. It was expected, therefore, that a significant decrease in absenteeism among students in

the experimental schools over those in the control schools would be observed as a result of comparing their posttreatment rates of absenteeism. As expected, a strong and positive relationship between the variables of parent notification and improved attendance was found to exist.

Upon rejecting the null of H_1 and accepting its alternative, the quality of the interventions, in terms of producing the desired effects became the issue of primary concern. While the telephone computer was expected to complete many more home contacts than personnel during the treatment period, the question of its superior effectiveness had been previously without documentation by formal research.

After testing H_2 , the performance of the computer group was found to have exceeded by far the expectations of the researcher while the productivity of the personnel group was unexpectedly low. As a result of this analysis, in fact, it became clear that the strong showing of the combined experimental groups (H_1) was due primarily to the effects produced by computer calls. The fact that students in the latter group experienced a mean increase in attendance of 1.76 (from 5.5 absences to 3.74) during the treatment period became even more impressive when the extent to which absenteeism increased in the control group (from a mean of 5.5 to 8.26 over 60 days) was considered.

While calls placed by personnel helped to slow, to a significant degree, the increase in absenteeism which was taking place across the school district during the experimental period, the data suggest several factors which may have contributed to the unexpectedly

low productivity of this group. First, the rate of completing notification calls (46.9 percent, of which only 35.9 percent reached adults) was low compared to the computer (87.3 percent, of which an estimated 70 percent plus reached adults). Although it was predicted that many more calls would reach parents in the evening when the computer was in operation, the extent of the difference in the contact rate was surprising. Furthermore, the length of time required to complete a personal call (almost 4 minutes per call for personnel versus 42 seconds for the computer) was a decided disadvantage faced by personnel. In fewer than 20 additional minutes, the computer was able to complete 180 more calls than attendance workers.

This difference in the number of calls completed by computer may have produced a residual effect (which deserves further study) which did not occur in the group receiving personal calls. The computer had the ability to saturate the population of absent students with notification calls early in the treatment period while personnel were much more limited in both number of subjects (594 against 1,775 for the computer group) and productivity. Consequently, early knowledge by students that computer calls were being made may have had a significant impact upon preventing absenteeism, even among students in the study whose parents received few or no calls.

Finally, the computer was capable of completing its task more consistently and efficiently than could personnel by virtue of the fact that it was not subject to human limitations such as fatigue, stress, illness, interruptions in the workplace and other physical and emotional conditions which impact productivity. Although these

advantages could have been anticipated prior to this study and, in fact, are cited regularly by the industry in promoting telecommunications products, previous research had not established that telephone computers were more effective than personnel in improving pupil attendance. The analysis of H₂, on the other hand, produced data supporting such a conclusion.

One of the most important questions examined in the present study was to what extent the public would accept recorded messages from a people-oriented institution. From experience, the researcher had been familiar with complaints that recorded messages used by various individuals and agencies for survey and sales purposes were, at best, depersonalized and usually an annoyance. Thus, a major concern developed around the possibility that the use of computers by schools for notification of absence purposes might result in negative public reaction. Consequently, the extent of positive public support for the use of telephone computers for attendance purposes, as reflected by the parent survey, was unanticipated.

The favorable public response was attributed to the following three items. First, parents in the population of students examined were usually not kept well-informed by school personnel of their children's absences (especially those experienced early in the school year); thus, the immediate and generally reliable response provided by the computer seemed to be important to those interviewed. Secondly, while most parents indicated that they disliked being addressed by a machine, the fact that the school messages were concerning their children's welfare seemed to account for the attitudinal difference

toward the use of the school computer. Finally, the prospect that the computers were cost-effective and could provide released-time for personnel to provide more concentrated attention to other significant educational concerns seemed to be valued.

With regard to this cost-effectiveness issue, it should be noted that the estimates developed in the study and used to compare dollar costs and benefits to the school system were intentionally conservative. First, it was necessary to consider so many variables and unknown factors in order to project such costs over time, that considerable variation could occur from one year to the next. For instance, in calculating ADA reimbursement in the present study, the \$3.54 per child, which was used to estimate expenditure and return figures, did not take into account additional money which the district was due to receive for items such as textbooks, classroom aides and transportation. These dollars were also based, in part, on ADA. Consequently, the cost-benefit differential between personnel and computers is likely to be greater than that suggested in Chapter IV.

One other area deserves discussion before addressing the conclusions and recommendations. Prior to implementing the present study, the researcher theorized that students with certain established patterns of attendance (i.e., low, moderate and high rates of absenteeism) would respond differently to notification of absence calls placed by computer and by personnel. However, the nature of these responses could not be reasonably predicted. The final three hypotheses (H_3 , H_4 and H_5) were developed in order to analyze any

differences detected among the variables of interest (i.e., patterns of attendance and methods of notification).

This issue becomes important when a school district is faced with a tight budget and/or limited support resources (in terms of personnel or hardware) and cannot or does not choose to call the homes of every non-attending student for which the cause of absenteeism is unknown. The analysis of H_3 , H_4 and H_5 produced some unexpected results in that the calls completed by computer positively affected the attendance of students who had experienced low, moderate and high rates of absenteeism during the pretreatment period. Among students receiving personal calls, however, only those who had low rates of pretreatment absenteeism improved their attendance in significant numbers. Students with moderate and high rates of pretreatment absenteeism, however, were relatively unaffected by personnel calls.

One possible explanation for the success of the computer in affecting a positive change in the attendance behavior of students across attendance categories might be that it possessed a "novelty" effect. Due to the fact that it was new, unexpected and relentless in performing its task, it may have had an intimidating effect upon the students who received its messages. The attendance personnel, on the other hand, did not possess the same degree of novelty or surprise, even to students who were not regular recipients of calls. Regardless of the reasons for the success of the computer, however, the data support the finding that notification calls are effective with students experiencing varying rates of absenteeism and none should be excluded from receiving them solely on the basis of their number of absences.

III. CONCLUSIONS

The first question which this study sought to answer was whether pupil attendance would improve as a result of providing parents with timely (same day) and regular notification of their children's absences from school. The researcher sought to answer this question by comparing the posttreatment attendance behavior of students who received notification calls with that of students who received no calls. Analysis of the resulting data supported a strong and positive relationship between parental awareness of their children's absenteeism and improved attendance. This finding lead to the conclusion that if parents are kept informed of their children's attendance problems, they are capable of effecting a positive change.

Additional conclusions drawn from this study grew out of the findings that (1) notification calls placed by telephone computers were more effective than those placed by personnel in improving pupil attendance while the latter was more effective than no calls, (2) telephone computers were more cost-beneficial than personnel in performing the notification function and (3) telephone computers were acceptable to the public for providing communication between home and school. It was concluded, therefore, that the implementation of an efficient system for providing parents with timely and regular notification when their children are absent from school should be among the first and most important steps which a school district should take in order to address adequately student attendance problems. Furthermore, personnel should not be used to perform routine telephone

notification functions, especially when considering that telephone computers can perform the same function more efficiently and at a fraction of the cost required for personnel.

The survey conducted with the parents of students who received computer-generated notification calls provided data which led to the following conclusions: (1) most parents are at home during weekday evenings and chances of completing notification calls of absence messages to them are high; (2) awareness by students that daily notification calls are being made will positively affect pupil attendance; and, (3) parents are more likely to accept innovative alternatives in education (i.e., the use of telephone computers for communication) if they believe that their children will benefit or the innovation can be proven to be more cost-effective than the traditional alternative.

The final conclusion drawn from the present study was made as a result of examining the effects of the treatments upon several students with varying patterns of absenteeism. It was concluded that the parents of all students who experience an absence from school should receive immediate (same day) notification and not just the parents of students with the worst attendance.

IV. RECOMMENDATIONS

The following are the recommendations which evolved from the findings and conclusions of this study. The first several recommendations are presented for consideration by practitioners and decisionmakers in local public school districts who may be considering

the purchase of telephone computers for use in addressing pupil attendance problems. First, and perhaps more important, is the recommendation that each school district should develop policies and/or attendance procedures that will insure regular (if not daily) notification to the parents of absent students. Not only does the present study document the cost-effectiveness of such a policy in terms of reduced absenteeism and additional ADA dollars, but successful implementation would most assuredly result in increased public support for the schools.

It is also recommended that the school district purchase telephone computers to use primarily for delivering these notification calls to the homes of absent students. The research supports this decision for all of the following reasons:

1. Computers will be more productive than personnel in terms of the number of calls completed, the time required to perform the task and the desired results (reduced absenteeism).

2. Computers will pay for themselves well within the first school year purchased and will be acceptable to parents as viable methods of communication between home and school.

3. Computers will handle what would be considered by some as a rather boring and time-consuming responsibility, thus freeing personnel to perform more significant and complex educational roles.

Cost of the telecommunications hardware should not be a prohibitive factor. At the time of this study, less expensive versions than the one used in this project on the market and could be purchased for as little as \$1,000. Many of these devices readily adapt to

microcomputers and can be purchased for less than one-fourth the cost of the self-contained unit used in this study. It is further recommended that attendance and/or teaching personnel should not, if possible, be required to assume the routine notification role unless telephone computers cannot be purchased. Not only is the employment of personnel in this role an extremely expensive option, but it is also a relatively ineffective one. It is recommended, instead, that personnel utilize the data collected by the computerized systems to enhance their early intervention, follow-up and support functions.

If, however, a district does employ personnel for making home contacts and computers cannot be purchased, it is recommended that serious consideration be given to scheduling a significant portion of their work time during the evening hours when parents are most likely to receive telephone calls. Based on the results of this study, it is logical to assume that this kind of flexible scheduling will result in increased efficiency and cost-effectiveness.

Finally, it is recommended that school districts which do purchase telephone computers should recognize their functional versatility and take steps to employ them creatively. As summarized in Chapter II, for example, telephone computers may be programmed by school personnel to deliver positive (i.e., recognitions) and informative (i.e., announcements), as well as notification messages and, most have a recording component which can be used to collect responses from the parties called.

A second series of recommendations were made for the benefit of those who might consider replicating the present study. It is

recommended that a matching technique be used with all subjects in the study, especially if the researcher has access to a large sample. The main purpose for using such a technique is to reduce initial differences between the experimental and control groups on the dependent variable. Since it is frequently not possible in public school settings to assign students randomly to treatments (thus, the use of intact groups is often necessary), sampling errors are considerably reduced by the use of matching. Consequently, the researcher has better control over extraneous variables while increasing the precision of data analysis in that he or she can apply the more powerful t-test for nonindependent samples when the difference-between-means is of interest.

A second design-related recommendation for those interested in replicating the present study is that some initial decisions should be made as to how extreme scores will be treated. Since the sample mean is always pulled in the direction of extreme scores, studies similarly designed will most likely result in disproportionately-skewed distribution. If one desires to reduce the influence of students with exceptionally poor attendance upon the experimental and control groups, some criterion should be established prior to the study which will systematically eliminate the most extreme scores.

Turning to the need for further research in this and related areas, it is recommended that a one to three year replication of the present study be made. Such a study would be valuable for several reasons. First, to explore further the possibility that the novelty effect of the computer may have contributed, at least in part, to the

findings in the present study, research needs to be replicated with a time-series analysis component. In addition, a longer-term study would create an extensive and invaluable data base which could be used (1) to calculate more accurate cost-benefit estimates, (2) to develop more realistic expectations regarding the performance and durability of the computer and (3) to evaluate better the impact of seasonal variables upon pupil attendance.

The present study also suggests the need for more extensive research in the following related areas. As the literature review points out, there is a paucity of formal research which supports a strong and positive correlation between parental awareness and pupil attendance. Future studies regarding this issue might also explore whether the content of the message delivered (i.e., positively, neutrally, or negatively stated) is important, or whether the role of the person delivering the message, either taped or in person, is significant (i.e., volunteer, secretary, teacher or principal). Finally, additional research is needed which examines the possible relationship between parental notification, pupil attendance and other classifying variables such as sex, race, social/economic status, and achievement.

Andrew Zucker (1978:229) maintains that the use of telecommunications in public education is likely to increase dramatically during the 1980's and that ". . . the only important questions for public debate relate to the effectiveness and social value of such application." It is the opinion of the researcher that the equipment examined in this study receives high marks on both

counts; and, as additional research is undertaken and field testing is completed, telephone computers will become as commonplace in the school building as chalk and erasers.

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APPENDIXES

APPENDIX A

SAMPLE COMPUTER MESSAGE

SAMPLE RECORDED MESSAGE DELIVERED BY TELEPHONE COMPUTER

This is _____, (assistant principal, counselor, attendance teacher, etc.) at _____ High School, with an important recorded message regarding your child's attendance. We missed your child at school today and hope that he or she will be able to return to classes soon. Regular school attendance is not only a requirement of state law, but it is essential in order for your child to receive a quality education. If today's absence was because of your child's illness or a family emergency, please remember to provide a written note describing the problem upon his or her return to school. This will allow us to assist your child in making up any assignments which were missed. If today's absence was without your knowledge, please contact me as soon as possible at _____ so that we may discuss this situation. Thank you for your cooperation in helping us to assure the best possible attendance at _____ High School.

APPENDIX B

SAMPLE OF A DAILY LOG

TO RECORD CALLS

KEY

DATE: _____

SCHOOL: _____

TIME TAKEN TO COMPLETE
ALL CALLS: _____

CA - Call Answered by Adult

CS - Call Answered by Child

NA - No Answer

BN - Bad Number

B - Busy After 3 Dials

I.D. NUMBER

STUDENT CALLED

PHONE NUMBER _____

RESULT * (See Key)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

APPENDIX C

SAMPLE OF DAILY PRINTOUT PRODUCED BY TELEPHONE COMPUTER

TABLE XVIII

SAMPLE OF DAILY PRINTOUT PRODUCED BY TELEPHONE COMPUTER

Time Number Dialed	Telephone Number	Result*
08:10 PM	254-7086	YES
08:12 PM	366-1365	YES
08:13 PM	367-0734	YES
08:14 PM	255-3034	YES
08:15 PM	297-6383	YES
08:16 PM	385-1295	BSY 1
08:16 PM	331-0635	BAD
08:17 PM	259-4677	NO 1
08:18 PM	361-3694	YES
08:19 PM	367-1292	YES
08:20 PM	832-1140	BSY 1
08:20 PM	320-5113	NO 1
08:21 PM	244-1799	BSY 1
08:21 PM	242-2733	BSY 1
08:22 PM	255-4114	YES
08:23 PM	361-0810	YES
08:24 PM	361-4584	YES
08:26 PM	365-6741	YES
08:27 PM	333-2054	YES

Truant Summary at 10:01 PM

Total Numbers Entered:	0215
Total Numbers Answered:	0181
Busy or No Answer Once:	0000
Busy or No Answer Twice:	0021
Busy or No Answer 3 Times or More:	0005
Total Bad Numbers Dialed:	0007
Have Not Been Dialed Yet:	0000
Total Numbers to be Dialed:	0021

*"YES" result means call completed on first attempt; "NO" means number dialed was not answered; "BSY" means the number was busy; "BAD" means number was disconnected, out of order, answered by another machine; a number after these responses indicates whether the call was the first, second, or third attempt.

APPENDIX D

SAMPLE REPORT PRODUCED BY MAINFRAME COMPARING PUPIL ATTENDANCE
BEFORE AND AFTER INTERVENTION

TABLE XIX

SAMPLE OF REPORT PRODUCED BY MAINFRAME COMPARING PUPIL
ATTENDANCE BEFORE AND AFTER INTERVENTION

School ID Number	Grade	Student Number	Student Name	Absent 1st 60 Days	Absent 2nd 60 Days	Difference*
087	09	358595		1	0	1-
087	09	419514		1	0	1-
087	09	416423		1	1	0
087	09	359517		1	4	3
087	09	325385		1	0	1-
087	10	273023		21	3	18-
087	10	305133		20	9	11-
087	10	302865		18	1	17-
087	10	290718		17	14	3-
087	10	302855		17	17	0
087	10	303014		16	9	7-
087	10	326771		16	5	11-
087	10	283543		15	14	1-
087	10	302961		14	13	1-
087	10	303806		14	16	2
087	10	293558		13	10	3-
087	10	301894		12	7	5-
087	10	303862		12	10	2-
087	10	418711		12	24	12
087	10	310344		12	5	7-
087	10	303797		11	6	5-
087	10	307035		11	18	7
087	10	311311		11	10	1-

*Negative difference indicates improved attendance after intervention.

APPENDIX E

COMPARISON OF PRETREATMENT-POSTTREATMENT ATTENDANCE
SCORES FOR STUDENTS RECEIVING PERSONAL CALLS,
COMPUTER CALLS, AND NO CALLS

TABLE XX

SAMPLE PRINTOUT COMPARING PRETREATMENT- POSTTREATMENT
ATTENDANCE SCORES AND CONTROL GROUPS

Number	Personal Calls		Computer Calls		No Calls	
	Pre*	Post*	Pre*	Post*	Pre*	Post*
121	01	03	01	06	01	01
122	01	04	01	05	01	02
123	01	03	01	00	01	06
124	01	02	01	02	01	05
125	01	10	01	01	01	03
126	01	01	01	01	01	05
127	01	01	01	03	01	01
128	01	03	01	00	01	01
129	01	00	01	00	01	03
130	01	00	01	01	01	17
131	01	01	01	00	01	03
132	01	05	01	01	01	06
133	02	04	02	02	02	04
134	02	04	02	01	02	05
135	02	02	02	01	02	05
136	02	00	02	00	02	07
137	02	01	02	03	02	04
138	02	03	02	00	02	00
139	02	04	02	01	02	03
140	02	01	02	00	02	09
141	02	00	02	02	02	00
142	02	02	02	02	02	05
143	02	07	02	00	02	06
144	02	05	02	01	02	11
145	02	08	02	02	02	03
146	02	02	02	02	02	01
147	02	04	02	03	02	06
148	02	02	02	00	02	04
149	02	00	02	02	02	03
150	02	05	02	01	02	06
151	02	04	02	01	02	03
152	02	05	02	00	02	07
153	02	04	02	07	02	05
154	02	09	02	01	02	01
155	02	10	02	09	02	04
156	02	02	02	01	02	05
157	02	06	02	01	02	02
158	02	03	02	02	02	01

VITA

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After moving to Nashville, Tennessee in 1969, he began a career with the Metropolitan Public Schools of Nashville and Davidson County. From 1969 to the present, he has served as a social studies teacher, a junior high school assistant principal, an associate principal in two comprehensive high schools, and an administrator at the district and central office levels.

In June of 1986, he received the Doctor of Education degree with a major in Educational Administration and Supervision from The University of Tennessee, Knoxville.

He is a member of Phi Delta Kappa, Tennessee Association of Middle Schools, Tennessee Association of School Social Workers, Tennessee Attendance Supervisors Study Council, the International Association of Pupil Personnel Workers, and a continuing member of the National Education Association.

He is married to the former Patricia Andrews Johnson of Decatur, Georgia. They have two daughters, Kelly Kristen and Carrie Rebecca.