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# A Comparison of the Impact of Two Different Levels of Item Response Effort Upon the Return Rate of Mailed Questionnaires

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A COMPARISON OF THE IMPACT OF TWO DIFFERENT LEVELS OF ITEM

RESPONSE EFFORT UPON THE RETURN RATE

OF MAILED QUESTIONNAIRES

by

Philip L. Rodgers

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# ABSTRACT

A Comparison of the Impact of Two Different Levels of Item Response Effort

Upon the Return Rate of Mailed Questionnaires

by

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Mail questionnaires are a popular and valuable method of data collection. Nonresponse bias is, however, a potentially serious threat to their validity. The best way to combat this threat is to obtain the highest possible return rate. To this end, many factors that are believed to influence return rates have been empirically studied. One factor that has not been empirically examined is the impact of item response effort on return rates, where response effort is defined as the amount of effort that is required by a respondent to answer questionnaire items.

The purpose of this study was to determine if the type of item response effort required to complete a questionnaire had any differential impact on the response rate of a mailed questionnaire. For this study, two questionnaires that differed only in the level of item response effort were sent to two randomly selected and assigned groups. The first group received a mailed questionnaire with seven questions that were answered by a

simple item response type (5-point Likert scale). The second group received a mailed questionnaire with seven questions that required a more difficult item response type (short answer).

A large difference between the return rates of the two questionnaires was observed, with the questionnaire containing questions that could be answered on a Likert scale having a higher return rate (56%) than the questionnaire containing questions requiring a short written response (30%). The results of this study provide evidence that the difficulty of item response effort affects the response rate of mailed questionnaires. The practical application of this finding is that researchers should endeavor to keep the types of item response on mailed questionnaires as simple as possible, to maximize response rates (unless, of course, the needed information can only be elicited by providing written responses).

(47 pages)

# ACKNOWLEDGMENTS

# CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# CHAPTER I

## INTRODUCTION

The first detailed account of a mail questionnaire appeared in the <u>Journal of the Royal Statistical Society</u> over 153 years ago (Scott, 1961). Since then, the use of mailed questionnaires has become one of the most popular methods used to gather data, and although its use has ebbed in popularity at times (Norton, 1930; Wallace, 1954), it remains a very popular data collection method (Dillman, 1991). Mailed questionnaires, however, are uniformly subject to a serious validity threat, that of low response rates resulting in possible response bias (Ratneshwar & Stewart, 1989).

The obvious solution to minimizing the threat of nonresponse bias is to increase return rates (Altschuld & Lower, 1984; Duncan, 1979). In efforts to determine how to increase return rates, there have been over 300 studies published that examine the various factors that are thought to affect response rates (Boser & Clark, 1993; Rodgers, 1992). The specific variables examined in these studies range from comparing the effectiveness of using different numbers of follow-up reminders to varying the color of questionnaires. In all, over 100 distinct independent variables thought to have an effect upon return rates have been examined in existing studies (Rodgers & Worthen, 1995).

One variable that has not received the attention it deserves is that of item response effort. Item response effort can be defined as the time and complexity of effort required by a person to respond to a particular question. Responding can be simple, as in the case of checking boxes for Likert responses, or more complex, as in the case of questions requiring written answers. In an analysis of 120 studies related to return rates, Rodgers

and Worthen (1995) found that item response effort (simple vs. nonsimple) was correlated at .47 with rate of return. In this research, simple response efforts were all those that required the respondent to select an answer from a given set of predetermined responses. Examples of these include: Likert-scales, yes/no, and check-boxes. Nonsimple response efforts were all others, most notably those requiring the respondent to provide written answers. This finding supports most survey researchers' commonsense assumption that mailed questionnaires on which responding is simple and straightforward have a higher rate of return than do those requiring complex responses. In fact, among factors that have a demonstrated effect upon the rate of return of mailed questionnaires, the influence of the level of item response effort is second only to the number of follow-ups in importance (Rodgers & Worthen, 1995), yet the influence of response effort on rates of return has not been directly examined by experimental design in prior studies.

Given the importance of mailed questionnaires as a method of data collection, it is important that any acceptable method that may increase the rate of return be examined directly, through controlled experimental study. Item response effort has been indirectly shown to have a positive effect on rates of return, yet this relationship was only made apparent through secondary analysis, which is an insufficient method to infer any causal relationship between item response effort and return rate. Therefore, the purpose of this research was to conduct a carefully controlled experimental study to compare the effect of two different levels of item response effort upon the return rates of mailed questionnaires.

## CHAPTER II

## REVIEW OF THE LITERATURE

This review is provided to support three assertions that are pivotal to this study. First, mailed questionnaires are a very popular and important method of data collection, yet the validity of this method has often been questioned because of the threat of nonresponse bias. Second, as a result, the potential factors that may increase return rates have received considerable attention among researchers. Third, the variable of response effort has not received the attention that it deserves. This review will summarize briefly the most relevant literature pertaining to each of these assertions.

### Importance of Mail Questionnaires

Mailed questionnaires are one of the most popular and important methods of data collection. Brzezinski and Worthen (1972) called mailed questionnaires "one of the most widely used research tools in education" (p. 3). Babbie (1973) stated that "survey research is probably the best known and most widely used research method in the social sciences today . . . . To some extent, everyone in the United States at least has been affected by surveys" (p. I). Hopkins and Gullickson (1989) stated directly that "the mailed questionnaire is the most common type of data-gathering procedure employed in survey research" (p. 1). Strand (1973) stated that "the mail survey has been widely accepted as a comparatively inexpensive and efficient procedure for gathering information about a specific population of persons" (p. 1). Mail surveys are even more popular than telephone surveys and face-to-face interviews (Dillman, 1991).

In the field of education, mail surveys are the most widely used research method. In their 3-year review of research methods used in dissertations in the School of Education at Indiana University, Fuqua, Hartman, and Brown (1977) found that between 50 to 69% employed surveys as the primary data collection method, stating, "Although we suspected it to be considerable, we were surprised at the extent to which survey methods were employed in these sources" (p. 5). Aiken (1988) echoed the findings of Fuqua et al. (1977) by stating, "My own observations indicate that over 50% of research papers and dissertations in education are reports of investigations in which some type of survey methodology has been employed" (p. 116). Mail surveys have also made an impact in other disciplines, including the field of marketing, as noted by Kanuk and Berenson (1975), "Market researchers have long recognized the obvious advantage of mail questionnaire surveys" (p. 440).

## Advantages of Mail Questionnaires

There are many reasons why mail questionnaires are popular, among them the fact that they are a relatively simple and inexpensive method of collecting data from large samples (Bailey, 1982). Mangione (1995) listed eight advantages of mail surveys: (a) they are relatively inexpensive; (b) they allow for large numbers of respondents to be surveyed in a relatively short period; (c) they allow respondents to take their time in answering and look up information if need be; (d) they give privacy in responding; (e) they allow for visual input rather than merely auditory input; (f) they allow the respondent to answer questions at times that are convenient; (g) they allow the respondent to see the context of a series of

questions; and (h) they insulate the respondent from the expectations of the interviewer. Mail surveys can also be effective in reaching hard-to-ontact subjects (Watson, 1965) and are less expensive than face-to-face or telephone interviews (Kephart & Bressler, 1958).

Because of these reasons, the use of mailed questionnaires spans a variety of disciplines, including advertising, business, education, medicine, psychology, and sociology, to name but a few (Dillman, 1991).

The Importance of High Return Rates

Despite the advantages inherent in mail questionnaires, a major drawback to this method of data collection is the very serious threat to validity that is posed when low response rates result in possible response bias due to differences between those who responded and those who did not (Armstrong & Overton, 1971; Barnette, 1950; Baur, 1947; Bishop, Hippler, Schwartz, & Stack, 1988; Champion & Sear, 1969; Cox, Anderson, & Fulcher, 1974; Daniel, 1975; Dillman, 1978; Eichner & Habermehl, 1981; Filion, 1975; Jones & Lang, 1980; Ratneshwar & Stewart, 1989). As stated by Borg and Gall (1989):

> If more that 20 percent of (potential respondents) are missing . . . it is very likely that most of the findings of the study could have been altered considerably if the nonresponding group had returned the questionnaire and had answered in a markedly different manner from the responding group. (p. 443)

Therefore, low response rates directly affect the ability of a researcher to generalize findings accurately to the target population. According to Brzezinski and Worthen (1972), "If less than 100% of the questionnaires are returned, members of the random

sample are lost and the returns cannot be treated as a random sample of the population"
(p. 5). Because of the threat of nonresponse bias, some researchers are hesitant to use
mail questionnaires as a method of data collection, despite their advantages (Levine &
Gordon, 1958).

Nonrespondent bias checks are one method of countering low response rates.
Although nonrespondent bias checks allow researchers to estimate the possible effects of
nonresponse, their use is complicated and becomes more problematic as the magnitude of
nonresponse increases (Borg & Gall, 1989). As stated by Duncan (1979), "The best way
to correct nonresponse bias is to prevent its occurrence" (p. 40). Other benefits of high
response rates include increased sample size and reduced costs associated with follow-up
contacts (Fox, Crask, & Kim, 1988). The importance of high response rates cannot be
overstated for, as noted by Odom (1979): "Response rates are frequently responsible for
the success or failure of a mail survey" (p. 3).

Because of these reasons, the primary focus of research concerning the problems
related to mailed questionnaires has focused on factors that may increase return rates.
Over 300 primary studies have focused upon methods designed to increase return rates
(Boser & Clark, 1993; Rodgers, 1992). Further testifying to the widespread interest in
this data collection method, studies related to increasing return rates of mailed
questionnaires have appeared in over 80 different journals (Rodgers & Worthen, 1995).

Methods of Increasing Rates of Return

Because of the importance of obtaining a high rate of return, over 100 distinct independent variables have been studied in relationship to their effect upon return rates (Rodgers & Worthen, 1995). Table 1 lists five past reviews of the literature relating to variables that influence return rates. The ranking of the effectiveness of 15 of these variables, as determined by each of the reviews, is found in this table. For example, Duncan (1979) has ranked prenotification as the best method of increasing return rates, personalization as second, and so on.

Table 1

Ranking of Variables Determined to Have Greatest Influence on Return Rates

| Variables | Linsky (1975) | Duncan (1979) | Harvey (1987) | Fox, Crask, & Kim (1988) | Yammarino, Skinner, & Childers (1991) |
|---|---|---|---|---|---|
| Prenotification | 2 | 1 | 4 | 3 | 2 |
| Follow-ups | 1 | 4 | 2 | 5 | 3 |
| Incentives, monetary | 5 | 3 | 5 | 1 | 1,4,5 |
| Incentives, non-monetary | | | | | 7 |
| Postage, outgoing | 3 | | | 7,9 | 11 |
| Postage, return | 3 | 5 | 3 | 4 | 13 |
| Personalization | 5 | 2 | | | 9 |
| Sponsorship | | 6 | | 2 | 9 |
| Anonymity | | | | | 14 |
| Appeals | | 7 | | 10 | 8 |
| Deadline | | | | 8 | 12 |
| Length | | | | | 15 |
| Color | | | | 6 | |
| Return envelope | | | 1 | | 6 |
| Appearance | | | | | 16 |

This table serves two functions: First, it demonstrates the diversity of variables associated with return rates; and second, it provides an idea of what the most effective variables related to increasing return rates have been. Based upon the results of these reviews, the most effective methods of increasing the return rates of mailed questionnaires seem to be prenotification, follow-ups, and monetary incentives.

Interestingly, one variable that has received no attention from these reviews, or from any primary research, is that of item response effort, defined as the amount effort that is required by a respondent to answer questionnaire items. It is interesting, because Rodgers and Worthen (1995) have reported a .47 correlation between the difficulty of item response effort and return rates.

Item Response Effort

In describing how to create an effective questionnaire, Mangione (1995) stated that "the flow of the questionnaire, the logical sequence of questions, the format of your answer categories, and the style of the whole questionnaire become issues that deserve your attention . . ." (p. 7). Ford (1968) said, "The mail questionnaire should be attractive, easy to fill out, have adequate space for response, and be legible. A neat, well-organized, attractive questionnaire should increase the response rate" (p. 43). Kristal et al. (1994) suggested that "burdensome" be added to the list of things to avoid in questionnaire construction: "Questionnaires that are too long or in other ways too burdensome are likely to yield poor response rates and bias a study's evaluation" (p. 224).

According to the above researchers, questionnaires should be "easy to fill out" (Ford, 1968), not be "too burdensome" (Kristal et al., 1994), and that the "format of . . . answer categories" (Mangione, 1995) is an important consideration in constructing a questionnaire. All of these issues are related to some degree with item response effort, yet the subject of item response effort has not been the subject of any direct experimentally designed research.

In addition to the concerns of these researchers (Ford, 1968; Kristal et al., 1994; Mangione, 1995) relating to item response effort, Christensen (1996) has postulated a model of the mailed questionnaire process that theoretically supports the impact of item response effort on mailed questionnaire return rates. When these issues are combined with the results of Rodgers and Worthen (1995), the importance of, and need for, direct experimental research on the variable of item response effort and its possible impact on return rates is apparent.

The following sections will address the theoretical basis for this research, examine the variable of length, which is theoretically related to item response effort and has been the subject of considerable research, and explore indirect evidence in support of the importance of item response effort on return rates.

Theoretical Considerations

A theoretical framework for the mailed response process has been developed by Christensen (1996), and from this model, a greater understanding of respondent behavior is gained that can be applied to this research. Christensen reported that beyond the "normal" physical elements related to mailed questionnaire response behavior (monetary

incentives, number of follow-ups, prenotification, and the like) there are two interacting

constructs at work: saliency and immediacy. Saliency is defined by Christensen (1996) as

> the quality of being important, prominent or noticeable (Heberlein &
> Baumgartner, 1978; Merriam-Webster, 1974). Factors of salience are
> closely allied with a value system. When salience is "acted upon," people
> are choosing to do or act upon the things they value or the things that are
> important to them. Salience can be psychologically, sociologically,
> politically, and geographically motivated, that is, interdisciplinarily
> motivated, in the mailed questionnaire process. (p. xvii)

Although important to the mailed questionnaire process, saliency relates more to

specific questionnaire content than it does to item response effort, and is therefore a

difficult variable to control for. Immediacy, however, relates directly to the possible

impact of item response effort on rates of return. Christensen (1996) defined immediacy

as the following:

> The quality or state of urgency, that prompts direct action and provides
> freedom from the feeling of need for immediate intervention (American
> Heritage, 1983; Merriam-Webster, 1974). Immediacy is action oriented.
> When immediacy is involved in the decision to respond, it will dictate the
> urgency and speed of one's efforts. Immediacy is motivated by the
> management of available resources, that is, freedom from external
> constraints upon time, energy, intellect, and so forth. (p. xvii)

Based upon the Christensen's theoretical model, the amount of resources (time)

required to complete a mailed questionnaire plays an important role in determining

whether that questionnaire is returned or not. That is, the greater the item response effort,

the greater the amount of time that is required to complete a questionnaire and the more

directly taking time to respond to the questionnaire comes into conflict with other events.

Therefore, while subject to other variables (most notably saliency), it is reasonable to

predict that item response effort can have a direct impact on the return rate of mailed questionnaires.

Length

Related to Christensen's model in the same way (expenditure of time) as item response effort, is the variable of length. Length, however, has been the subject of a tremendous amount of research, and the debate over the influence of questionnaire length upon return rates has long been controversial, even acrimonious. Much of this controversy stems from what many consider to be the commonsense assumption that the longer the questionnaire, the lower the rate of return. As stated by Berdie (1973), "Common sense suggests that the shorter the questionnaire, the more likely a high response rate, and persons studying questionnaire efficiency have tended to accept this belief in spite of little empirical evidence to support it" (p. 278). Such is the nature of the debate that Roszkowski and Bean (1990) entitled their primary study on the topic <u>Believe it or Not! Longer Questionnaires Have Lower Response Rates</u>. However, there are many researchers who still do not believe it.

In their review of the literature, Boser and Clark (1996) found that out of the 15 experimental studies they examined regarding this issue, 8 resulted in a greater return rate for the shorter questionnaire, 4 in a greater return rate for the longer, and 3 had ambiguous results.

Part of the controversy surrounding the issue of length can probably be explained by how length is defined: by the number of pages or the number of items in a questionnaire. In a preliminary review of the literature, Rodgers and Worthen (1995) reported that when

defined by the number of pages, there is a .17 correlation between length and rate of return. When defined by the number of questions, there is -.12 correlation between length and rate of return.

Despite protestations to the contrary, length does not appear to be a significant factor in influencing return rates; at best, length may interact with other, more influential, variables such as saliency and immediacy (Christensen, 1996).

Indirect Evidence of Item Response Impact

Item response effort is much like length, in that it has been postulated that the longer the questionnaire, the less likely it is to be returned (Berdie, 1973). Unlike length, there have been no empirical studies related to response effort and rates of mailed questionnaire return. There is, however, some evidence that the level of item response effort does influence rate of return.

Although primary research regarding the influence of item response effort has not been conducted, this relationship has been studied indirectly by Rodgers and Worthen (1995). In a preliminary review of the literature related to variables that influence the return of mailed questionnaires, the authors coded 120 studies on over 30 different variables, including item response effort. This variable was scored dichotomously as simple and nonsimple item response effort. Simple item response efforts were all those that required the respondent to select an answer from a set of predetermined responses. Examples of these include: Likert-scales, yes/no, and check-boxes. Nonsimple item response efforts were all others, most notably those requiring the respondent to provide written answers. A point-biserial correlation of item response type and the corresponding response rate

yielded a coefficient of .47, demonstrating a strong relationship between the effort required to respond and the rate of questionnaire return. This result was remarkable, because, based upon this research, the level of item response difficulty is second only to number of follow-ups ($r = .56$) in strength of relationship to response rates.

## Summary

It is clear that the use of mailed questionnaires is a popular and important method of data collection that has been the focus of much research. This method, however, is subject to a serious threat to its validity from nonresponse bias. The influence of item response effort, which has been shown by Rodgers and Worthen (1995) to be indirectly related to response rate, and is supported by a theoretical model (Christensen, 1995), has not been directly studied through experimental methods. It is important, then, that the impact of response effort be determined, through experimental methods, so that its possible influence can be determined.

# CHAPTER III

# HYPOTHESIS

The purpose of the proposed study was to compare the direct impact of two different levels of item response effort upon the return rates of mailed questionnaires. The objective of this research was to determine if the perceived effort required to complete a mailed questionnaire has a practically meaningful and statistically significant effect on the rate of return of that questionnaire, where practical significance is defined as a difference of 10% or more in return percentage and where statistical significance is defined at the .05 level.

The hypothesis upon which this research is based states that the greater the effort required of a respondent to complete and return a mailed questionnaire, the less likely that respondent is to return that questionnaire. This hypothesis is derived from existing research and theory. In a theoretical model of the mailed questionnaire process, Christensen (1996) posited that economy of time is a significant factor in determining whether someone returns a mailed questionnaire or not, that potential respondents "assess how immediately important it would be . . . to return the questionnaire in light of other time constraints" (p. 38). Thus, questionnaires should be easy to respond to (Leedy, 1993; Shaughnessey & Zechmeister, 1994), and be brief (Leavitt, 1994; Roszkowski & Bean, 1990; Salkind, 1994) so they conflict as little as possible with other time constraints. It is therefore logical to hypothesize that the greater the effort required to respond to questionnaire items, the less likely the questionnaire is to be returned.

CHAPTER IV

METHODOLOGY

This chapter describes the methodology and procedures used in this research. It provides details about the population and sample used, the type of research design, and data collected and instrumentation.

## Population and Sample

The sample for this study was randomly selected from the population of parents of students who attend a rural/suburban Northern Utah school district (approximately 5,000 households). These parents were selected to participate in a mail survey of parent attitudes and opinions related to the use of computers in their child's school. A random sample of approximately 4% of these parents ($N = 206$) was drawn and randomly assigned to each of the two experimental conditions. Subjects were unaware of the nature of the research being conducted in relation to perceived response effort and its possible influence on return rates. All subjects were informed that the use of the data collected through the questionnaire they received related to the use of computers in the schools and would be used by the school district to make technology-related decisions.

## Design

This study utilized a true experimental design, with subjects randomly selected from the target population and each subject then randomly assigned to one of two treatment conditions. This is a strong design that allows for causal interpretations and eliminates

many possible threats to the validity of the results. The independent variable for each of these conditions was the type of response required to complete a series of seven items on a mailed questionnaire. In the first condition, the potential respondents were presented with questionnaire items requiring them to circle one of five possible Likert responses for each item. In the second condition, the survey questions covered exactly the same content, but the questionnaire items required the subjects to respond by providing a short answer for each item. The dependent variable was the same for both conditions, that being the proportion of questionnaires that were returned by mail.

## Data and Instrumentation

Item response effort can be broadly defined as the complexity of effort required by a subject to respond to a particular question. Item responses can be simple, such as a series of check boxes for a Likert response, or they can be complex, such as those requiring a detailed written response. For the purposes of this research, simple item responses were defined by 5-point Likert responses that required respondents to merely circle one of five possible responses for each item. Nonsimple responses were defined as those that required the subject to write out a short response for each item, without the benefit of a presupplied set of responses.

The questionnaire items for each treatment condition were matched for content, so they were as identical as possible given the different types of responses required for the two different types of items. Table 2 contains a side-by-side display of the items contained on the questionnaires for each of the treatment conditions.

Table 2

Items Requiring a Likert Response and the Corresponding

Items Requiring a Short Answer Response

| Item Number | Items Requiring a Likert Response | Item Number | Items Requiring a Short Answer Response |
|---|---|---|---|
| 1. | I am very familiar with the use of computers in my child's school. | 1. | To what extent are you familiar with the use of computers in your child's school. |
| 2. | I am satisfied that my child's school is doing a good job of teaching computer skills. | 2. | How satisfied are you that your child's schools is doing a good job of teaching computer skills? |
| 3. | My child's school has done a good job of informing me about computer use in school. | 3. | Please describe how well your child's school has kept you informed about computer use in school? |
| 4. | Learning computer skills is an essential part of my child's education. | 4. | How convinced are you that learning computer skills is an essential part of your child's education? |
| 5. | The teaching of basic skills is suffering because of the use of computers in the schools. | 5. | To what degree, if any, do you believe that the teaching of basic skills is suffering because of the use of computers in the schools? |
| 6. | My child's school is doing a good job of utilizing computer technology in the education of my child | 6. | To what extent do you believe that your child's school is doing a good job of utilizing computer technology in the education of your child? |
| 7. | School money used to purchase computers and related equipment would be better spent on other educational materials. | 7. | How do you feel about the claim that school money used to purchase computers and related equipment would be better spent on other educational materials? |

The Likert items were preceded by the following instructions: "Please respond to the

following statements by circling the response that best represents the way you feel about

the statement. Use the following code: SA = strongly agree; A = agree; NS = not sure; D

= disagree; SD = strongly disagree." The short-answer style questions were preceded by

instructions to "Please answer the following questions by writing a short response."

Copies of both questionnaires can be found in Appendix A.

Survey Method

The survey was conducted jointly by Utah State University's Research and Evaluation

Methodology Program and the Western Institute for Research and Evaluation.

Questionnaires were sent to subjects in a #10 white envelope, by first class metered mail,

with the author's name and Utah State University as the return address. Each envelope

contained three separate survey components: (1) a cover letter, (2) the one-page

questionnaire, and (3) a business reply envelope. The cover letter, which was used with

both treatment groups, contained an appeal for parents to fill out and return the enclosed

questionnaire to help the school district better serve the educational needs of families (a

copy of the letter can be found in Appendix B). The business reply envelope had the

Psychology Department of Utah State University as its address.

All of the envelopes were mailed at the same time. At the end of 2 weeks, data

collection was halted, and the proportions of returns for each of the experimental

conditions were calculated. No follow-ups were used because this study was concerned

with how the difficulty of item response effort affected response rates in the absence of

other variables.

CHAPTER V

ANALYSIS AND RESULTS

The objective of the research was to determine if the level of effort required to complete a mailed questionnaire items has any meaningful effect on the rate of return of that questionnaire. In order to determine the possible effect of response effort on return rates with a high degree of validity, a true experimental design was utilized. This design incorporated both random sampling and random assignment, and the manipulation of a single independent variable.

There were 206 subjects in the study, 103 in each treatment group. Each of the 103 subjects in each group was mailed the questionnaire appropriate for that group. However, 18 of these questionnaires were returned by the U.S. Postal Service, marked as undeliverable. This resulted in a "reachable" sample size of 96 for the Likert response group and 92 for the short-answer response group (see Table 3). Of the 96 possible returns for the Likert response group, 54 were returned for a return rate of .56. Of the 92 possible returns for the short-answer response group, 28 were returned for a return rate of .30.

Such a dramatic difference in return rate, with that yielded by the Likert responses nearly doubling that produced by the short-answer response format, is impressive and suggests this information will be of great practical importance to survey researchers. To examine the potential significance of this difference further, statistical significance testing was conducted, confidence intervals and an effect size were calculated, and the practical significance of these results was discussed.

Table 3

Questionnaires Mailed and Questionnaires Returned

| Category | Likert Response | Short-Answer Response |
|---|---|---|
| Total Questionnaires Mailed | 103 | 103 |
| Questionnaires Returned Undeliverable | 7 | 11 |
| Total Possible Returns | 96 | 92 |
| Total Number Returned | 54 | 28 |
| Proportion Returned | .56 | .30 |

Statistical Significance Testing

To determine if the proportion of returns vary to a statistically significant degree between the two treatment conditions, a statistical significance test of proportions was conducted. Figure 1 contains the formula for this test (Hinkle, Wiersma, & Jurs, 1988), where $p_1$ = the proportion of returns and $n_1$ = the total number of possible returns for the

$$z = \frac{(p_1 - p_2)}{\sqrt{pq(1/n_1 + 1/n_2)}}$$

Figure 1. Equation for determining $z$-statistic.

first treatment condition (Likert response items); $p_2$ = the proportion of returns and $n_2$ = the total number of possible returns for the second treatment condition (short response items); $p$ = the total proportion of returns for both treatment conditions; and $q = 1 - p$. The test statistic is $z$. (Table 4 contains the statistics and values used in the formula.)

Given return proportions of .56 for a sample size of 96 and .30 for a sample size of 92, the $z$-score for differences in proportions is 3.59. The critical value for the two-tailed .05 level of statistical significance is 1.96. Since the $z$-score exceeded the critical value, the null-hypothesis, $H_0$: $P_1 = P_2$, is rejected in favor of the alternative hypothesis. Since both random sampling and assignment were employed, it is highly unlikely that this result occurred by chance.

## Confidence Interval

By using the formula in Figure 2, the .95 confidence interval for the differences found in the proportions was calculated. Given the proportion difference of .26, a critical value

Table 4

Statistics and Values Used in Analysis

| Values | | | Description |
|---|---|---|---|
| $p_1$ | = | .56 | Proportion returned for Likert response group |
| $p_2$ | = | .30 | Proportion returned for short-answer response group |
| $p$ | = | .44 | Proportion return for both groups combined |
| $q$ | = | .56 | $1 - p$ |
| $n_1$ | = | 96 | Sample size for Likert response group |
| $n_2$ | = | 92 | Sample size for short-answer response group |
| $S_{p1 - p2}$ | = | .07 | Standard error (short notation for the denominator of Figure 1) |

$$CI_{95} = (p_1 - p_2) \pm (\text{critical value}) \times (\text{standard error})$$

Figure 2. Formula for .95 confidence interval.

of 1.96, and a standard error of .07, the confidence interval is .12 to .40. Given this result, it is reasonable to be 95% confident that the true difference between proportions lies between .12 and .40.

## Practical Significance

It is difficult to gauge exactly what is practically significant in terms of response rates. Mangione (1995) has offered some evidence when stating that response rates between 70 to 85% are very good, 60 to 70% are acceptable, and 50 to 60% are barely acceptable. On the basis of this scale, 10% seems to be the practically significant difference between what is considered barely acceptable and acceptable, and acceptable and very good response rates. When applied to the findings of this research, the resulting 26% difference between the two types of response efforts has great practical significance. The difference could have the effect of elevating a return rate from unacceptable to very good on Mangione's scale.

## Effect Size

The effect size for the difference between proportions was calculated by first setting the minimum acceptable rate of return. This was determined to be .50 based upon

Mangione (1995). (The validity of this percentage as a minimum acceptable return rate would quite obviously vary according to the purpose of the research being done, and as such is only being used as a guide for the effect size being calculated.) By using .50 as the benchmark, it can be calculated that the return rate for the questionnaire containing Likert item responses was .06 greater than this benchmark, which converts to .15 standard deviations (based upon a standard $z$-table). The return rate for the short answer response items was .30, or .20 less than the .50 benchmark. This .20 difference converts to .53 standard deviations. Added together, these standard deviations equal .68, which is the effect size for the difference in return rates. According to Cohen (1988), an effect size of this magnitude falls between being moderate (.50) and large (.80).

# CHAPTER VII

## DISCUSSION AND CONCLUSIONS

There are very few well-defined variables that have a generally consistent positive influence upon the return rate of mailed questionnaires; these are, monetary incentives, follow-ups, and prenotification (Rodgers & Worthen, 1995; Yammarino et al., 1991). Perhaps, based upon the results of this research, a fourth item—item response effort—should be added.

From a commonsense viewpoint, the results are not unexpected. The difficulty of the item responses required to complete a mailed questionnaire appears to influence the rate of return of that questionnaire. The implication for research using mailed questionnaires is clear: Keep the effort required to complete questionnaire items as simple as possible.

From a theoretical perspective, the higher response rate for the questionnaires containing items requiring simpler response effort can be viewed as an issue of the distribution of resources. In her construction of a theoretical framework for the mailed questionnaire process, Christensen (1996) posited that immediacy and saliency are strong predictors of response behavior. Item response effort is directly related to immediacy, in that the time it takes to complete and return a mailed questionnaire is in conflict with other events that also require time, and a potential respondent will have to decide in what activity time is best spent. This conflict can be diminished by using more simple item responses in the construction of a questionnaire.

This relationship necessarily interacts with questionnaire saliency. Such a relationship should be examined in future research by the manipulation of topic saliency and degree of item response effort.

In relation to other factors that have been found to influence return rates, response effort may be one of the most important. Table 5 compares the findings of this research with the relative influence of various methods of increasing return rates, as compiled and analyzed in the recent review of Green and Hutchinson (1996). The results for special delivery, which demonstrated a strong impact on return rates, were taken from older studies conducted when the use of special types of mail delivery were more prevalent. Therefore, special delivery is not considered to be a relevant method of improving return rates.

Although the other factors distributed in this table represent mean results across numerous studies, and it is likely with additional research that the impact of item response effort will be diminished somewhat, the impact of item response effort on the return rate of mailed questionnaires is considerable when compared with other important variables.

## Limitations and Future Research

Additional future research related to response effort would do well to concentrate on the following three areas. First, replication. Probability being what it is, these results need to be replicated before they are considered conclusive. Replication with the use of different target populations would also provide useful information. Second, gradations of response effort need to be measured. At what point is a potential respondent inclined to

Table 5

Comparison of Item Response Effort Result with Results from a Recent Review

| Variable | Number of Studies | Mean Difference[a] | 95% Confidence Interval | | |
|---|---|---|---|---|---|
| Response Effort | 1 | 26.00 | 14.1 | to | 37.9 |
| Special delivery | 11 | 16.08 | 9.8 | to | 22.4 |
| Enclosed incentive vs. promised | 18 | 15.60 | 9.9 | to | 21.3 |
| Enclosed incentive vs. none | 52 | 15.49 | 12.8 | to | 18.2 |
| Follow-up | 13 | 12.30 | 7.4 | to | 17.2 |
| Prenotification | 33 | 10.40 | 6.6 | to | 14.2 |
| Sponsorship | 7 | 9.45 | 4.4 | to | 14.5 |
| Postage | 28 | 5.72 | 2.9 | to | 8.5 |
| Length | 19 | 4.69 | 0.2 | to | 9.1 |

[a]The mean difference equals the return rate of the comparison group subtracted from the return rate of the experimental group, and, in the case of Green and Hutchensen's review, averaged across all similar studies in the review.

dismiss a questionnaire because of the degree of response effort required to complete it? And third, is there a primacy effect involved in questionnaire response? If the first portion of a questionnaire contains items requiring a simple response effort, and the latter portion contains items requiring a more complex response effort, is that sufficient to increase response rates over a questionnaire whose items all required a complex response effort, or

had questionnaire items in the first portion requiring a complex response effort and items requiring a simple response effort in the second portion?

## Summary

The use of mailed questionnaires is a popular and important method of data collection. It is subject, however, to the serious threat of nonresponse bias. Low response rates not only threaten the validity of research using this method, but they also increase the costs of research. The best way to reduce the threat of nonresponse bias is to increase return rates. Many variables have been studied to determine their influence on mailed questionnaire return rates. Incentives, follow-ups, and prenotification have been shown to have the greatest, and most consistent impact on return rates. Based upon the findings of this research and Christensen's (1996) theoretical model of the mail questionnaire process, item response effort may well have as great an impact on return rates as these other variables, and thus needs to be given serious consideration by anyone engaged in survey research and desirous of maximizing return rates.

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APPENDICES

APPENDIX A:

Questionnaires Used in Research

# Cache County School District
## Technology Survey

Directions: Please respond to the following statements by circling the response that best represents the way you feel about the statement. Use the following code: SA = strongly agree; A = agree; NS = not sure; D = disagree; SD = strongly disagree.

|  | strongly agree | agree | not sure | disagree | strongly disagree |
|---|---|---|---|---|---|
| 1. I am very familiar with the use of computers in my child's school.............................................. | SA | A | NS | D | SD |
| 2. I am satisfied that my child's school is doing a good job of teaching computer skills................... | SA | A | NS | D | SD |
| 3. My child's school has done a good job of informing me about computer use in school .......... | SA | A | NS | D | SD |
| 4. Learning computer skills is an essential part of my child's education ................................. | SA | A | NS | D | SD |
| 5. The teaching of basic skills is suffering because of the use of computers in the schools ................. | SA | A | NS | D | SD |
| 6. My child's school is doing a good job of utilizing computer technology in the education of my child | SA | A | NS | D | SD |
| 7. School money used to purchase computers and related equipment would be better spent on other educational materials ........................................... | SA | A | NS | D | SD |

## Cache County School District
## Technology Survey

Directions:  Please answer the following questions by writing a short response.

1.  To what extent are you familiar with the use of computers in your child's school?

2.  How satisfied are you that your child's school is doing a good job of teaching computer skills?

3.  Please describe how well your child's school has kept you informed about computer use in school?

4.  How convinced are you that learning computer skills is an essential part of your child's education?

5.  To what degree, if any, do you believe that the teaching of basic skills is suffering because of the use of computers in the schools?

6.  To what extent do you believe that your child's school is doing a good job of utilizing computer technology in the education of your child?

7.  How do you feel about the claim that school money used to purchase computers and related equipment would be better spent on other educational materials?

APPENDIX B:

Content of Cover Letter

# WIRE

Western Institute for Research and Evaluation

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November 12, 1996

Dear Parent:

In an effort to better serve the educational needs of Cache County families, the Cache County school district has contracted with the Western Institute for Research and Evaluation to conduct an evaluation of the use of technology in the schools. As part of this evaluation, we would like you to fill out the enclosed questionnaire. The questionnaire should take no longer than a few minutes to complete. Once you have finished it, please place it in the enclosed business reply and mail it.

The information you provide will help the school district make better informed technology-related decisions. If you have any questions concerning this evaluation, please call me at 753-8616.

Sincerely,

Philip Rodgers
Evaluation Coordinator