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A MODE COMPARISON BETWEEN MAILED AND INTERNET SURVEYS

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

Craig T. Layman  
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**DEDICATION PAGE**

This dissertation is dedicated to my biggest supporter  
and best friend, whose never-ending love, constant  
encouragement, and steadfast patience endured throughout  
this process, my wife, Neisha.

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sacrifice made many years of education possible. And most importantly, I would like to thank my wife, Neisha and daughter, Taylor Nicole. Your all-encompassing dedication, love, and encouragement was the guiding beacon for completion of my studies.

**ABSTRACT**

This descriptive, cross-sectional study was conducted as a mode experiment using a questionnaire to collect data on student technology usage at a small, private Christian College. The purpose of this study was to compare and analyze response rates and times from a self-administered questionnaire delivered by Internet or mail. Follow-up interviews reported reasons why participants did not respond. Two randomly selected samples (stratified by traditional and adult categories) were assigned to receive the questionnaire by mail or Internet. Randomization for each sample was proportional, based on key variables used in the study. The first sample (traditional category) consisted of 124 students, while the second sample (adult category) consisted of 276 students for a total sample size of 400.

Of the main findings of the study, a significantly higher percentage of mail surveys (43.88%) were returned than that of Internet surveys (10.05%). Interview data indicated that the large discrepancy stemmed from the Internet subgroup having no memory of receiving the questionnaire. Of the factors that contributed to no

memory, the one most reported was respondents did not check their College provided e-mail account. While 30% reported they routinely or daily check their e-mail account, 70% indicated they never or rarely check their account. Although more mail questionnaires were returned than Internet, 45% of all completed Internet questionnaires were returned before the first mailed questionnaire. Overall, the average response time to receive an Internet questionnaire was significantly faster (7.5 days for Internet, 11.2 days for mailed).

The findings for this study suggest response rates for Internet surveys still lag behind mailed surveys. Confounding the lower response rates was the lack of conformity to College policy in regards to students checking their College provided e-mail account. These findings demonstrate the need to conduct further research on modal differences and to conduct further research with the population understudy.

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## CHAPTER 1

## INTRODUCTION

*Background*

The undeniable and quantifiable growth of the World-Wide-Web (Internet) over the past two decades continues to outpace previous mediums "affecting the way people communicate, interact, and gather information" (Amiel & Sargent, 2004, p. 711). In fact, the rise of the Internet as a technological medium in American should become particularly interesting to researchers who view the Internet as a continuously evolving communication network. Originally developed as a cooperative governmental/private research venture, the Internet became readily available to the general public in the early 1990s. Since then, however, growth of the Internet has continued, with the rate of new users in 2002 exceeding more than 2 million per month (Department of Commerce, 2002). Even more enticing to researchers is the amount of Americans purported to have Internet access. According to the Department of Commerce, more than one-half, or 54%, of the U.S. population was

online in 2002, an increase of 26 million users in 13 months since late 2001.

Because enrollment in nation-wide Internet usage is increasing, researchers, especially in the fields of marketing research and economic development, are starting to understand the growing potential for contact between social science researchers and Internet users (Sheehan & Hoy, 1999). Accordingly, a growing area in survey research studies Internet users and web-based survey methodologies. This shift to examine the online use of surveys may seem obvious, given today's technological access and the low cost attractiveness. However, concerns exist for many researchers. The literature emphasizes the nature of these concerns beginning with the four common sources of error.

Coverage error, according to Couper (2000) is the most common concern and biggest obstacle for web-survey researchers. Past limitations, such as smaller general population segments, forced researchers to focus their efforts on similar populations with known Internet access (Schaefer & Dillman, 1998). Fear of noncoverage error, according to Schaefer and Dillman, reduced the number of researchers willing to study other populations. To date,

researchers have limited their study to a more homogenous population, limiting the effects of coverage error.

Sampling error is also common and provides several challenges for researchers attempting to identify the population sample (Couper, 2000). A common worry, according to Nardi (2003), is the researcher's ability to generalize from the sampling frame, thereby making the sample selection from the population list extremely important. Unfortunately, sampling error cannot be completely eliminated (Salant & Dillman, 1994). However, sampling error can be reduced and minimized if researchers use an appropriate sample size. However, researchers must take great care in the sample selection, as personal bias can create errors in sampling (Patten, 2002).

Questionnaire nonresponse is also very important to survey researchers and the design must be carefully planned to reduce nonresponse (Groves, 1989). Survey nonresponse occurs, "when a significant number of people in the survey sample do not respond to the questionnaire and are different from those who do in a way that is important to the study" (Salant & Dillman, 1984, p. 20). Theoretically, it is possible to eliminate nonresponses in certain types of surveys (e.g. population census). However, total

elimination of nonresponse, even with a technologically sophisticated homogeneous population identified may be very difficult, and at best, lower the risk of nonresponse in Internet surveys; thereby increasing response rates (Couper, 2000).

Another concern for survey researchers is measurement error. Measurement error "occurs when a respondent's answer to a given question is inaccurate, imprecise or cannot be compared in any useful way to other respondent's answers" (Salant & Dillman, 1994, p.17). However, it is different from sampling error in that it exists from four sources, not from the sample list (Salant & Dillman). In this instance, researchers must be extremely sensitive to the survey method, the questionnaire, the interview process, and the target respondents (Salant & Dillman).

In many situations fears of the four major sources of error are starting to wane in the wake of increasing Internet usage for all persons regardless of gender, race, age, education, and income (Department of Commerce, 2002). As the number of Internet user's increases regardless of demographic barriers, survey researchers, many of whom are starting to fully understand the importance of the Internet on survey research, are taking steps to ensure the

functionality of web-based surveys as an important new medium. The logic and purposes of the many types of scientific survey research, however, continues unabated. "While survey research refers to a particular type of empirical social research, many different kinds of surveys exist," noted Babbie (1990, p.51). Surveys might include customer satisfaction polls, voter preference polls, empirical studies and other similar forms, all administered through traditional and Internet formats (Babbie). The intentions of surveys, in general, remain the same, even as Internet surveys become more and more common (Nardi, 2003).

Couper (2000) was quick to caution the blanket use of the term "Internet Survey"; instead, he presented an in-depth typology for categorizing this term. He categorized Internet surveys in two distinct categories: probability and non-probability surveys. Selection of participants in non-probability surveys is not random. For example, entertainment and self-volunteering are two types of non-probability surveys (Couper). Conversely, probability surveys use random sampling for selection of the participants. For example, e-mail surveys and mixed mode surveys are two types of probability surveys (Couper).

According to Couper (2000), the astonishing rate at which researchers are using the Internet to study survey methodologies is leading some to argue that they will replace other survey methods. Shannon and Bradshaw (2002) agreed that the increase of technological advancements within web-based survey methodologies and the overall positive potentials of this new medium are likely to produce a tremendously positive return in the field of survey research. Echoing this sentiment, Crawford, McCabe, Couper, and Boyd (2002) claimed many researchers were at a crossroad, "as web surveys become more commonly used for social science survey data collections, many researchers are facing the decision of whether or not to integrate this new mode into their new or ongoing research programs" (p.2). Thus, stated Birnholtz, Horn, Finholt, and Bae (2004), important areas of this new mode involve understanding how to achieve desirable response rates.

In order to compare Internet survey methodologies to those of traditional paper and pencil surveys, researchers commonly measure equivalencies within response rates (Kaplowitz, Hadlock, & Levine, 2004). Simply stated, response rate refers to the percentage of participants that choose to respond to the survey (Salant & Dillman, 1994).

The higher the response rate, the lower the chance of non-response error (Salant & Dillman). Comparable studies, overall, are unclear and suggested mixed results concerning response rates. Some studies indicated, especially within populations segments that are Internet savvy, that Internet surveys produced higher or comparable response rates (Fetterman, 2002; Kaplowitz, Hadlock, & Levine, 2004; Parker, 1992; Schaefer & Dillman, 1998). However, as Schaefer and Dillman noted, most studies have reported lower response rates for Internet surveys than traditional paper surveys (Bachmann, Elfrink, & Vazzana, 1996, 1999; Couper, Blair, & Triplett, 1997; Couper, 2000; Smee & Brennan, 2000; McCabe, Diez, Boyd, Nelson, & Weitzman, 2006).

Lower response rates continue to be a problem. According to Kaplowitz, Hadlock, and Levine (2004), there are many reasons why web-survey researchers are experiencing differences in response rates. One reason is the relatively short time researchers have had to empirically study and test Internet and e-mail surveys (Kaplowitz, Hadlock, & Levine). Agreeing, Schaefer and Dillman (1998) contended that the amount of knowledge in mail surveys far outweighs that of Internet surveys, making

higher response rates more difficult to achieve.

Undeterred by the lower response rates, primarily because of the low cost attractiveness, researchers are now focusing efforts toward improving Internet survey methodologies, thereby increasing the number of researchers willing to use this approach.

A widely accepted advantage of Internet surveys and a major factor contributing to the willingness of researcher's to study Internet surveys is cost. Costs associated with Internet surveys, in comparison to traditional paper and pencil mailed surveys, continue to be reported lower than their counterparts (Bachman, Elfrink, & Vanazza, 1996, 1999; Schafer & Dillman, 1998; Sheehan & Hoy, 1999; Tse, 1998). In a study conducted by Crawford, McCabe, Couper, and Boyd (2002), comparable costs associated with Internet surveys were reported approximately 40% lower than traditional paper and pencil mailed surveys. Analyzing the cost structure holistically, Crawford et. al. (2002) determined traditional paper and pencil mailed surveys, on average, were expensed 222% more than questionnaires associated with Internet surveys.

### *Statement of the Problem*

According to Dillman (2002), the Internet, much like the other methods prior, is not serving as an immediate replacement to other survey methodologies. To date, survey research using the Internet as a data collection mode has experienced problems with population restrictions, limited sample frames, lower response rates, and continuously developing technologies (Dillman). Although, it seems clear that more objective, empirical research is needed to fully understand the challenges this new medium poses and to alleviate trepidation of utilizing this mode, especially in populations that are considered technologically savvy.

In this study, the methodologies of Internet and traditional paper and pencil mailed surveys will be used to examine the differences in response rates and response times in a representative sample of student respondents. Following the design of a similar research project (Crawford, McCabe, Couper, & Boyd, 2002), this study seeks to replicate the formative process using a smaller, homogenous student population, one with limited, although adequate, technological access. The differences in the formative procedures for using campus technologies between the former design and the present study afford the

opportunity to infer results to separate, similar populations.

Technological limitations, such as older and slower computer labs and workstations, manual course registrations (no phone or Internet), limited or no Internet storage space, limited or no campus wireless hotspots, and limited or no ability to view bursar accounts online differentiates this study's population from the former. This study's population consists of students from a small, private religiously affiliated liberal arts institution of higher learning.

Unlike most surveys whose primary purpose is to measure a particular area of interest in an identified sample of a population (Cox, 2005), this survey serves a dual or joint purpose. Traditionally, the primary purpose of surveys, according to Salant and Dillman (1994), is to "determine what proportion of a predetermined population has a particular attribute or opinion" (p.30). Specifically stated, probability surveys are used to gather data in order to support or refute the research questions. Although true for this study, a problem exists between the dual purposes of the survey instrument. Using the above definitional statement, the primary purpose of this study's

survey instrument was to gather data concerning student perceptions of campus technology usage. The secondary purpose of this study's survey instrument is to provide the participants an inclusive level of salience to respond to the study without increasing measurement error (Sheehan, 2001). There still exists the possibility the subject or content of the instrument itself can affect the results of the response rate and time study.

#### *Purpose*

The purpose of this descriptive study was divided into two parts. The first purpose was to compare and analyze the differences in response rates and response times using traditional mailed paper and pencil survey methodologies and newer Internet methodologies in a representative sample of student respondents. It is believed that a sample consisting of higher education students represents a more technologically advanced population segment (Daley, McDermott, Brown, & Kittleson, 2003).

The second purpose was to identify respondent reported reasons why the sampled participants chose not to respond to mailed and Internet surveys. The second purpose is to better understand the differences in response patterns

between Internet and paper and pencil mailed surveys. It is important to identify and understand the dynamics of unit nonresponse within multiple population segments to assist the researcher with the sample design. Survey costs and the costs of controlling unit nonresponse, for many researchers, drive this process to increase response rates and decrease unit nonresponse (Groves, Dillman, Eltinge, & Little, 2002).

In addition, the second purpose, or nonresponse study, assisted the researcher in understanding the dual nature concern of the survey instrument. Through analysis of the data and the nonresponse study, the dual nature concern was addressed.

### *Research Questions*

The following research questions guided this study:

1. To what extent do response rates differ between Internet survey methods and mailed survey methods?
2. To what extent do response times differ between Internet survey methods and mailed survey methods?
3. How do response rates and response times differ by demographic characteristics such as age, gender, race, and academic major?

4. What are the factors that make student participants choose not to respond to Internet surveys?
5. What are the factors that make student participants choose not to respond to mailed surveys?
6. To what extent does the content of the survey instrument influence participant response without regard to delivery mode?

### *Delimitations*

The following is a list of topic items this study did not examine:

1. This study will not attempt to discuss and report the reasons for item nonresponse.
2. No attempt will be made to provide participants with extra incentives to respond to the survey instrument.
3. For the participants chosen to receive the survey instrument through e-mail, this study will only survey full time enrolled (FTE) students with a Tusculum College student e-mail account or reported personal e-mail account.
4. This study will not report the effects of instrument design on response rates.

### *Assumptions*

This study assumed the following:

1. The population segment is homogeneous and considered technologically savvy.
2. The population segment understands how to browse the Internet and uses the Internet on a regular basis.
3. The population segment will be representative of small, private, religiously affiliated institutions of higher learning.
4. There is a need to understand response rates and times in Internet survey research, and growing interest in the low cost attractiveness of Internet surveys will continue.
5. The survey instrument will provide the necessary salience for inclusion to the study without biasing the validity of the instrument.
6. The sensitivity of the survey instrument will minimize item nonresponse and provide lower measurement error.
7. The survey topic will be of interest to the participants.

### *Limitations*

The population segment for this study is limited to full time enrolled students at Tusculum College, a small private civic arts institution of higher learning. Although there exists the possibility to infer the results to institutions of similar demographics, the constricted population segment makes results not generalizable. In addition, the dual nature of the survey instrument created a unique understanding of the study design by placing two discrete constraints on the instrument. The first unit understood the method of delivery resulting in an unbiased mode comparison. The second unit affected the content of the instrument resulting in a possible bias of the mode delivery. The results for the discrete units will be presented in Chapter Four.

### *Importance of the Study*

Researchers are beginning to look at the effects of increased Internet usage and Internet survey methodologies [Bachman, Elfrink, & Vazzana, 1995, 1998; Couper, Blair, & Triplett, 1997; Couper, 2000; Schaefer & Dillman, 1998; Tse, 1998], but more objectively tested work needs to be done. Accordingly, a growing, yet modest, area of research

in Internet survey methodologies examines equivalences in response rates and response times (Kaplowitz, Hadlock, & Levine, 2004), to traditional paper and pencil mailed surveys. To date, the literature suggests response rates from web-based surveys continue to trail that of traditional paper and pencil mailed surveys (Bachmann, Elfrink, & Vazzana, 1995, 1998; Couper, Blair, & Triplett, 1997; Couper, 2000; Yun & Trumbo, 2000; McCabe, Diez, Boyd, Nelson, & Weitzman, 2006). One reason, asserted by Schafer and Dillman (1998), is the small amount of empirically tested Internet research in relation to other survey methods. Because of the explosion of Internet usage, there exists a need to empirically and quantitatively study this new medium using different survey populations.

The influences of Internet surveys provide advantages for survey researchers. One decided and reported advantage is response time (Schafer & Dillman, 1998; Sheehan & Hoy, 1999). In a study conducted by Schafer and Dillman, response times for Internet surveys were reported considerably faster than traditional paper and pencil mailed surveys. They reported, on average, e-mail administered surveys were approximately five days faster than the mailed survey. They reported, over 50% of e-mail

surveys were returned prior to the first mailed survey. Subjecting the data to parametric statistical analysis, they concluded there was a significant difference in response times between e-mail and paper and pencil mailed surveys. Researchers are recognizing the usefulness of faster response times to promote the study and development of Internet survey modalities.

As with any research effort cost becomes increasingly important for the researcher and the funding agency. Past research indicates one distinct advantage for Internet surveys is the relative low costs compared to traditional paper and pencil mailed surveys (Crawford, McCabe, Couper, & Boyd, 2002; Dillman, 2000; Tse, 1998). The most obvious cost savings is postage, but there are other potential financial savings with Internet survey methods. Timesavings associated with the arduous task of stuffing, folding, and mailing of the survey instrument speeds transmission and distribution and benefits the environment by reducing the amount of paper products (Nardi, 2003; Tse, 1998). Data entry becomes quicker and more efficient, thereby eliminating the need for researchers to painstakingly enter data into statistical programs, freeing them to undertake more appropriate tasks (Mertler, 2002).

In addition to adding new knowledge to the field of survey methodology, this research provides the institution understudy information concerning response patterns of their students. Therefore, understanding new modal developments within survey research becomes important for administrators and faculty soliciting responses from their students.

### *Definitions of Terms*

Cross-sectional design: A survey that collects descriptive data at one particular point in time (Babbie, 1990).

Descriptive design: describes the purpose of the survey (Babbie, 1990).

Estimator: "A function of the sample observations that estimate a population parameter" (Biemer & Lyberg, 2003, p. 315).

Estimate: "A realized value of the estimator" (Biemer & Lyberg, 2003, p.315).

Frame: "List of population units that will be used for sampling" (Biemer & Lyberg, 2003, p.315).

Generalizability: "the applicability of a survey's findings to populations and places other than those involved in the survey" (Fink, 2002, P. 78).

Heterogeneity: A group of people who are diverse or do not share common attributes or traits.

Homogeneity: A group of people who share common attributes or traits; a group of people who are alike or similar in some way (Babbie, 1990).

Incentive: A gift, sometimes monetary, given to survey participants in hope of increasing response rates in the study.

Instrument: The document used to collect the responses of the survey participant.

Internet: A decentralized, continuously evolving communication network.

Item Nonresponse: "Failure to obtain substantive answers to individual survey questions" (Groves, Dillman, Eltinge, & Little, 2002, p. 12).

Population Parameter: "Summary value characterizing the population to be estimated" (Biemer & Lyberg, 2003, p. 315).

Survey Methodology: "seeks to identify principles about the design, collection, processing, and analysis of

surveys that are linked to the cost and quality of the survey estimates" (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004, p. 30).

Survey Population: "Collection of units that will be represented on the frame" (Biemer & Lyberg, 2003, p. 315).

Target Population: "Collection of all units we want to study" (Biemer & Lyberg, 2003, p. 315).

Technologically Savvy: For the purpose of this study, a group of people who have above average computer and Internet skills.

Unit Nonresponse: "Failure to obtain any survey measurements on a sample unit" (Groves, Dillman, Eltinge, & Little, 2002, p. 6).

### *Organization of Study*

The formative process for introducing this study is systematic and sub-divided into five discrete chapters. The first chapter, or Chapter I, presents the introduction to the problem, the research questions, and outlines the foundational parameters of the study. Chapter II reviews survey methodology literature, including Internet and mailed questionnaires. Chapter III, the methodology section, provides information concerning the sample, the

instrument, data collection procedures, and data analyses.

Chapter IV presents findings and reports on the analysis of the data. Chapter V provides a summary of the study, conclusions, and recommendations.

## CHAPTER 2

*REVIEW OF THE LITERATURE*

Although historical researchers agree with the longevity and validity of the many forms of social science surveys (most notably probability surveys), research validating the useful effectiveness of web or Internet surveys is mixed, at best (Bachmann, Elfrink, & Vazzana, 1995, 1998; Couper, Blair, Triplett, 1997; Couper, 2001; Fetterman, 2002; Kaplowitz, Hadlock, & Levine, 2004; Parker, 1992; Schaefer & Dillman, 1998). However, increasing Internet access is leading some researchers to understand the importance of Internet surveys as a new mode in survey methodology (Couper, 2000).

In order to understand the foundational methods for conducting Internet surveys and to demonstrate support for the hypothesis and research questions, it was necessary to conduct and review an extensive and exhaustive study of the literature related to survey methodology, in particular Internet survey and mail survey methodologies.

The challenge for this study is the nature of the broad topics and the voluminous literatures that exist on

these topics. After careful review, the following four topics attempt to demonstrate support for the hypothesis and research questions: (a) historical review of survey methodologies and modalities; (b) the four main sources of survey error; (c) current research on web surveys and response rates; and (d) the survey topic and its importance to the validity of the study.

### *Historical Underpinnings of Survey Research*

*The Census.* The very nature of survey research, its relationship to social phenomena, and the historical underpinnings associated with survey research trace their roots back many generations and hundreds, arguably thousands of years. For the context of this literature review, two time periods are discussed: the biblical census and the modern survey. Biemer and Lyberg (2003) reported that the earliest record of a known census could be found in the Christian Bible. Mandansky (1985) argued the foundations of the biblical census could be found using data gathered from the Old Testament texts of the Christian Bible. In addition to the Old Testament texts, the biblical census can also be found in the New Testament texts. Bulmer, Bales, and Sklar, (1991) reported "at the time of the birth of Jesus, Joseph and Mary were traveling to

Bethlehem to be registered in a census" (p. 1). Thus, known records exist of the Roman Empire commissioning registration of a population census (House, Juster, Kahn, Schumann, & Singer, 2004).

While many researchers agree the most common survey throughout history is the census, it has only been within the last 100 years that the body of knowledge guiding social science research methodologies experienced an alarming increase in technological and scientific methodologies (House, Singer, Kahn, Schuman, & Juster, 2004). Before today's standards in methodology and enlightenment of social science inquiry, the census was the most commonly used mode for data collection on the general citizenry. Common for its solicitation and enumeration of the entire population, the census was mainly used for taxation and demographic purposes (Babbie, 1990). In many instances, the general citizenry was skeptical of a census. Moreover, the population often feared the census because of new taxes or military requirements (Kertzer & Arel, 2002). Taxation centuries ago, much like today, required accurate empirical data only found by systemically enumerating the entire population (Kertzer & Arel).

The census, commissioned by the aristocracy or ruling lineage, was geographically difficult to undertake and shared many shortcomings with today's census (Kertzer & Arel, 2002). One shortcoming noted by Dillman and Salant (1994) was that the population size required costly, large scale research projects. They stated:

for large populations numbering in the thousands or millions, censuses are unwieldy and enormous undertakings. For example, the 1990 Census of Population and Housing required over 350,000 workers and about 2.6 billion to complete. (p. 6)

Conversely, the census, with today's advancements in sampling and data collection techniques, still can prove very valuable for researchers. "In some cases," noted Dillman and Salant "a census is the only way to get accurate information, especially when the population is so small that sampling part of it will not provide estimates of the whole" (p. 6).

The current study of survey methods, or survey methodology, has most recently advanced its body of knowledge to today's understanding (within the past 100 hundred years). By modern definition, the term survey is different from its predecessor, the census, because the

term survey implies the use of a sample to collect empirical data (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004). Adhering to the strictness of the definition and the foundational basis of the design, Groves et. al. (2004), defined survey as, "a systematic method for gathering information from a sample of entities for the purpose of constructing quantitative descriptors of the attributes of a larger population of which the entities are members" (p. 2). However, the term survey, during the beginnings of American survey research carried a much different meaning.

Converse (1987) described the early definitional term survey from, "Old French 'survoir' meaning to oversee" (p. 18). Comparatively, this simplistic meaning is similar to the modern definition of survey; however, other comparisons between the modern understanding and early understanding of the term survey end, especially when considering the development of sampling techniques and modes of data collection (Converse).

*1880-1920.* The beginnings of social science surveys, or the survey of people and society, did not develop until the late 19<sup>th</sup> Century when, as some argue, Charles Booth first surveyed many factions of the citizenry in London, England

(Anderson & Fienberg, 1999). Inspired by previous studies undertaken by Karl Marx and his supporters, Booth (1920) disagreed with reported findings and began to study the living and working conditions of Londoners using objective scientific inquiry techniques (as cited in Converse, 1987). These quantitative techniques were considered a departure from the norm, differing from total enumeration of the population, although they were not modern in respect to defined sampling techniques and data collection modes (Converse). However, Booth's statistical techniques were an improvement over the "political arithmetic" used at that time (Bulmer, Bales, & Sklar, 1991).

As the fervor of Booth's work continued, other researchers, inspired by Booth, were working to replicate Booth's designs (Converse, 1987). B. Seebohm Rowntree in his native England and W.E. Dubois in the United States extensively examined the working poor in their respective cities (as cited in Converse). Using techniques similar to Booth's, Rowntree and Dubois (1920) enumerated large sections of the city, consulted previously collected data, both census and aggregate, and painstakingly collected new data (Converse). It was at this time that a newer definition of survey was developing.

During the time period of 1880-1920, the definitional term survey drastically changed to include more than the total enumeration of a population or the limited "oversight" of a research project. Surveys now included five characteristics:

- **Fieldwork:** the survey was conducted in the natural world of events, objects, and people rather than exclusively in the artificial or arranged world of the laboratory or clinic or in the statistical world of existing records;
- **Scope:** the survey undertook comprehensive coverage of some domain, providing an overview of the whole;
- **Detail:** the survey's overview was based on the examination of detailed cases;
- **Quantification:** At least some of the detail was summarized by quantifying some of the case material;  
and
- **Individual unit of analysis:** Data were collected, organized, and analyzed by individual records  
(Converse, 1987, p.21).

The definitional change moved surveys closer to the modern perspective and further rooted survey methodology in

"scientific inquiry, mathematics, and probability theory"  
(Biemer & Lyberg, 2003, p. 8).

*1920-Present.* Many important developments of survey research are traced to the time period immediately following the First World War (House, Juster, Kahn, Schuman, & Singer, 2004). The beginning of the twentieth century saw the movement toward sample representation over the entire enumeration of the population (Converse, 1987).

Anders Kiaer is widely considered the father of the representative sample, although he did not advocate full randomization (Biemer & Lyberg, 2003). He did however, as Converse (1987) stated, "deem the representation of the population more important than sample size" (p. 42).

Kiaer's attitude and new probability theory was not readily accepted. Many of his peers were very skeptical and argued that a sample could not replace total enumeration of the population (Biemer & Lyberg).

For some researchers, however, Kiaer's theory was gaining support; most notably, Arther Bowley and Jerzy Neyman. Bowley's contributions to sampling theory came when he published a series of papers on statistical theory and survey design (Biemer & Lyberg, 2003). Converse (1987) reported that Bowley argued for the full use of sample

estimation to replace total enumeration or partial sample methods. However, Biemer and Lyberg noted that Bowley did not advocate full sample selection but argued for partial sample methods using a mixture of random and purposive selection. Following the works by Bowley, Jerzy Neyman in 1934 published, "On the Two Different Aspects of the Representative Method: the Method of Stratified Sampling and the Method of Purposive Selection," furthering the foundational understanding of sample methodology. Neyman (1934) agreed with Bowley and Kiaer but advocated random sampling should be tested differently than purposive selection.

During the years after the Second World War, scientific understanding of survey methodology flourished. The promotion of survey research became the primary focus of and distinguished from a variety of individuals, governmental bodies, and advancing institutions. Academics, such as Rensis Likert, Samuel Stouffer, and Paul Lazarsfeld, largely guided survey methodologies scientific advancements (Babbie, 1990). In 1932, Likert developed an attitude scale that is a virtual standard in modern survey research (Converse, 1987). Stouffer, who studied under statistical greats such as Fisher, Pearson,

and Bowley, furthered the survey statistical movement by testing older enumeration methods with the current sampling methods (Converse). Lazarsfeld, as many researchers give him credit, expanded the automation of data processing equipment for survey analysis (Babbie, 1990). In addition, Lazarsfeld founded a research center in support of scientific inquiry into survey research methods.

The founding of survey research support centers brought about increased funding and support for survey research methodology (Babbie, 1990). As House, Juster, Kahn, Schumann, and Singer (2004) noted:

Survey research can be conducted at many levels, but as science develops, larger scale methods and instrumentation tend to be required for further progress. Thus with survey research, as with other major methods or instruments of science, advances in methodological, substantive, and theoretical knowledge increasingly require institutional arrangements that can sustain large-scale and long-term research programs, while allowing the broad scientific community both to influence their research designs and to utilize the resulting data. (p. 5)

The role of governmental bodies, such as the United States Census Bureau, continued to promote and develop survey research methods (Babbie, 1990). Survey researchers for many decades have relied on information and data gathered by the Census Bureau (Anderson & Fienberg, 1999).

*Sample Surveys and Validity: Four Sources of Survey Error*

An association among sample surveys, validity, and the four sources of survey error has been well established in the literature (e.g. Dillman, 2000; Groves, 1989; Sapsford, 1999; Torangeau, Rips, & Rasinski, 2000). Furthermore, there is longitudinal evidence that supports controlling the four sources of error as key to a quality-based, valid survey research design (e.g. Dillman, 1978, 2000; Groves, 1989; Groves, Fowler, Couper, Lepkowski, Singer, Tourangeau, 2004). As a consequence, it is important to strategize the survey design in a way that will minimize survey error and increase survey quality. The following discussion summarizes the four sources of survey error by showing a relationship between survey quality and survey error.

*Sampling Error.* To minimize sampling variation in probability samples and the biases it presents, survey

researchers must be careful in the sample selection process of the survey design. To be assured of total elimination of sampling error, especially when dealing with a population frame that is very small, researchers commonly use total enumeration techniques (Salant & Dillman, 1994). However, these techniques have proven costly, impractical, and inefficient when dealing with larger populations (Coladarci, Cobb, Minium, & Clarke, 2004). Researchers now employ sampling techniques to choose participants.

Biemer and Lyberg (2003) reported that classical sampling theory has evolved into modern sampling theory. They stated modern sampling theory traces its development from "purposive selection techniques to simple random sampling, and ultimately to unequal probability sampling using complex designs" (p. 309). Groves, Fowler, Couper, Lepkowski, Singer, and Tourangeau (2004) agreed stating that sample designs share three basic features:

1. A list or combination of lists of elements in the population
2. Chance or random selection of elements from the population
3. Some mechanism that assures that key subgroups of the population are represented in the sample (p. 94).

Moreover, sampling theory represents the elimination of researcher biases, or personal biases, from the participant selection process (Groves, et al).

Sampling theory also invites error due to the selection of a few and not the entire population (e.g. Biemer and Lyberg, 2003; Groves, 1989). This error, commonly called sampling error by statisticians, is reported broadly in the literature (e.g. Dillman, 1978, 2000; Groves, 1989; Nardi, 2003; Patten, 2005; Salant & Dillman, 1994; Sapford, 1999). The unknown within the chance selection of the population, according to Groves, Fowler, Couper, Lepkowski, Singer, and Tourangeau (2004), creates selections that will vary, therefore creating sampling bias and error. Fortunately, this error can be controlled, thereby increasing survey quality, by using a sample of proportionate size (Biemer & Lyberg, 2003).

By calculating the standard error of the population estimate, using the standard error formula (Equation 1), researchers can determine the amount of sampling error that can be tolerated (Biemer & Lyberg, 2003; Dillman, 2000).

Equation 1

---


$$Se(p) = \sqrt{\frac{pq}{n}}$$

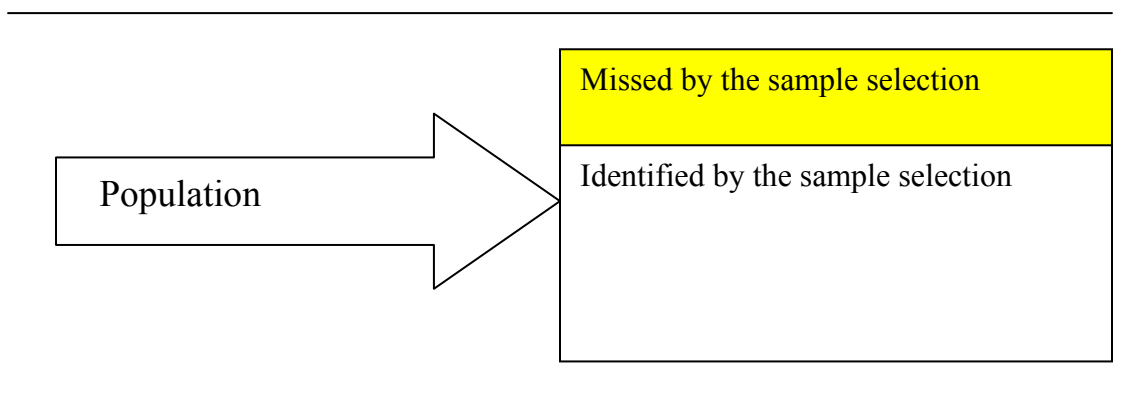
where  $se(p)$  = standard error of a proportion  
 $p$  and  $q$  = the proportions of our sample that do (p)  
and do not (q) have a particular  
characteristic  
 $n$  = the number of elements in the sample

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(Salant & Dillman, 1994, p. 73).

By comparison, a confidence interval of 95% may be used to set a desired amount of error in the estimate (Biemer & Lyberg). Researchers then determine the sample size needed to reduce sampling error (Biemer & Lyberg).

*Coverage Error.* Identifying a target population frame that will produce quality estimates of the sample is a major concern for survey researchers. As a consequence, survey researchers should carefully select and place restrictions on the target population during the research design (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004). Therefore, failure to completely understand the target population frame may result in non-observational error called, coverage error (Biemer & Lyberg, 2003).



*Figure 1. Coverage Error (adapted from Biemer & Lyberg, 2003, p. 64)*

Coverage error occurs when data is missing from the target population frame, as illustrated in Figure 1 (Biemer & Lyberg, 2003). In turn, missing data present biases that may result in under or over selection of the target population in the survey sample (Biemer & Lyberg).

This leads to a bias effect on the survey statistic, or the number of participants in the sample (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004). When it becomes apparent that the sample estimate is biased in the target population, researchers face a difficult decision:

1. Redo the target population to better fit their needs
2. Describe the nature of the coverage error in the target population and how it relates to the research design (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, p. 49).

Both decisions face multiple limitations.

The measures of coverage error and coverage bias may be mathematically expressed and systematically controlled (Biemer & Lyberg, 2003; Groves, 1989). To control coverage error within the target population, either by minimizing coverage bias or completely eliminating it altogether, the literature emphasized several methods (Biemer & Lyberg, 2003; Groves, 1989; Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004). One strategy is the employment of multiple population frames (Biemer & Lyberg). Both Groves et. al. and Biemer and Lyberg suggested the use of supplemental frames to compliment the main population frame. In addition, Biemer and Lyberg noted the multiple frame option as a more cost-effective for many researchers.

*Measurement Error.* A well established link can be found in the literature between survey quality and measurement error (Biemer & Lyberg, 2003). Measurement error is often referred to as error of observation and nonsampling error (Biemer & Lyberg; Groves, 1989; Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2004). Moreover, this controllable source of error is found outside the study of sampling and may be directly found in the questionnaire, interviewer, and respondent (Biemer &

Lyberg). This type of error underscores the need for a quality questionnaire and an experienced interviewer. In addition, measurement error gives rise to a branch of survey research that reports on the effectiveness of questionnaire quality called psychometrics (Litwin, 1995).

According to Tourangeau, Rips, and Rasinski (2000), the beginnings of psychometric theories can be traced back several decades ago to Likert, Guttman, Thurston and others who conducted measurements tests on attitude and psychological response, including the idea of judgment. Several years later, Cannell, Miller, and Oksenberg (1981) published a response model "that reflected the new cognitive outlook within psychology" (as cited in Tourangeau, Rips, Rasinski, 2000, p. 5).

In 2000, Tourangeau, Rips and Rasinski proposed their own response model. Their model included four distinct areas that respondents follow when selecting an answer to a survey question:

1. Comprehension-this area centers on the respondents ability to understand and assign meaning the question, to understand the instructions of the questionnaire, and to develop links between the two;

2. Memory retrieval-this area centers on the respondents ability to recall information stored in short and long term memory;
3. Judgment-this area centers on the respondents ability to make inference about what they retrieve; and
4. Response-this area center on the respondent's ability to provide an answer to the questionnaire or interviewer (Tourangeau, Rips, & Rasinski, 2000, pp. 8-15).

Tourangeau, Rips, and Rasinski's model showed that respondents may, with or without malice, provide an incorrect answer to a questionnaire or interviewer. The wording and appearance of the questionnaire, then, becomes a possibility for measurement error. Accordingly, controlling measurement error becomes essential to a quality-based questionnaire or interview (Dillman, 2000).

*Nonresponse.* There are many variables that affect a respondent's willingness to complete and return a questionnaire. Some variables are within the researcher's control. Therefore, the researcher must consider the wording and appearance of the questionnaire, the delivery method, the topic, survey length, incentives and many other issues before, during and after the design phase (Biemer &

Lyberg, 2003; Couper, 2000; Dillman, 2000, Groves, Presser & Dipko, 2004). According to Biemer and Lyberg, other variables exist that are not within the researcher's control. Several social variables, such as community culture and political awareness, and participant variables, such as mental stability and survey knowledge, increase the chance for nonresponse.

The literature suggested two types of nonresponse—unit and item (Biemer & Lyberg, 2003; Dillman, 2000; Groves, 1989; Groves, Fowler, Couper, Lepkowski, Singer & Tourangeau, 2004). Unit nonresponse occurs when the respondent fails to complete and return the questionnaire (Biemer & Lyberg). Item nonresponse occurs when one or multiple items on a questionnaire are not completed but the respondent returns the questionnaire (Biemer & Lyberg).

Safeguards to control unit and item nonresponse, in particular, the variables within the researcher's control, must be implemented during the research design process (Groves, Dillman, Eltice, & Little, 2002). Groves et. al. reported the costs of reducing nonresponse are directly related to the mode of data collection. For example, they reported a low cost to reduce nonresponse associated with an e-mail not received for a web survey, but a high cost of

reducing nonresponse when a participant's computer can not access or download the web survey.

### *Research on Web-Surveys*

Growing in popularity within the past decade, the Internet is promising a significant role in survey modality development. Practically everywhere, the Internet was reported to reach over one-half of the U.S. population in 2002 (Department of Commerce, 2002). Fostering this trend, College and University campuses are some of the most wired places in the U.S.

*Types of Internet Surveys.* In explaining the different types of Internet surveys, Couper (2000) categorized two distinct areas in his findings: (a) Probability-Based Internet Surveys, and (b) Nonprobability-Bases Internet Surveys. "Probability surveys," wrote Couper, "are sample driven, but does not guarantee representativeness, as non-response may threaten the inferential value of these surveys" (p. 484). He further wrote:

But, unlike nonprobability designs, with knowledge of the universe or frame and with information on the process of recruitment, these approaches permit

measurement of the sources of nonresponse, which could be used to better inform design-based (as opposed to post-stratification-only) adjustment approaches. (p. 484)

Couper described four types of probability surveys:

1. Intercept-this type of survey uses pop-up windows to ask participation from the web-site visitor. Sampling theory is used as intercept-based surveys invite every "x" visitor to the site to take the survey. However, with the advent of pop-up blockers, this type of survey raises concerns about nonresponse and coverage error.
2. List-Based-using this type of survey, the known population possesses a high degree of coverage, suggesting that the distribution of characteristics for inclusion of the study would be satisfied. It is common to solicit response through e-mail. Although coverage error is of lesser concern, researchers must still worry about nonresponse.
3. Mixed-Mode-this method gives Internet surveys an alternative choice to the participant. For example, participants may be solicited by U.S. mail and given

the opportunity to complete a paper and pencil questionnaire or an Internet based questionnaire.

4. Pre-recruited Panel- Sampling techniques are used to recruit the participants, unlike strait volunteers. Telephone recruitment occurs first. Next, eligible participants are recruited to the Internet panel. Coverage and nonresponse remain a key concern for this type of Internet survey. (pp. 484-490)

The second area categorized by Couper (2000) was Nonprobability Internet Surveys. Couper grouped and described Nonprobability methods as non-sample approaches:

1. Entertainment Surveys- these polls are common on many websites and do not use random sampling techniques. Any webuser visiting the website may participate in the poll. For the most part, the term scientific will not accurately state the focus of this type of poll;
2. Self-selected Surveys-these surveys mainly solicit participants through the use of portals, announcements, banner ads, and survey sites. Restriction on access and multiple submissions is limited; and

3. Volunteer panels- mainly uses portals on popular websites to solicit participants. Demographic information is collected and stored for use with other surveys (pp. 477-482).

Understanding the different types of Internet surveys and the frequency with which Internet users experience these surveys, serves as a contextual backdrop for supporting the research questions of this study.

*Design of Internet Surveys.* There are many software features, such as advanced graphics, motion and animation, and sound and hardware features, such as screen size, processor speed, and memory that influence web-based survey design and that may have a profound impact on response rates (Couper, Traugott, & Lamias, 2001; Dillman, Tortora, Conradt, & Bowker, 1998). Compounding these complexities, some participants have limited access to hardware and software that will operate the functionality of sophisticated survey designs (Dillman, Tortora, Conradt, & Bowker). Because of these limitations, increased importance must be placed on the design of the Internet survey (Couper, 2000).

In 1998, Dillman, Tortora, Conradt, and Bowker presented findings on research concerning plain versus

fancy design to the American Statistical Association in Dallas, Texas. They concluded that plain design questionnaires, ones without advanced graphics, color, animation, sound, etc., produced higher response rates than those considered fancy, or ones with advanced graphics, animation, sound, etc. One reason, they hypothesized, was the slower load and transmission times for fancy design surveys. However, they were quick to point out that load and transmission times should decrease with advancing technology.

In a similar study, Couper, Traugott, and Lamias, (2001) reported that web survey design and load times have an effect on nonresponse. They suggested finding a happy medium between simple designs and advanced designs that will increase load time and produce an aesthetically pleasing appearance.

One viewpoint concerning general design principals was offered by Dillman, Tortora, and Bowker (1998). They suggested 11 principles (Table 1) for developing quality web-based questionnaires they called respondent-friendly. They defined respondent friendly as:

designs that reduce the occurrence of sample survey errors through the improvement of the motivational

Table 1

Dillman et. al. Principles for Respondent Friendly Questionnaires

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Principle	Description
Principle 1	Introduce the web questionnaire with a welcome screen that is motivational, emphasizes the ease of responding, and instructs respondents on the action needed for proceeding to the next page
Principle 2	Begin the questionnaire with a question that is fully visible on the first screen of the questionnaire, and will be easily comprehended and answered by all respondents
Principle 3	Present each question in a conventional format similar to that normally used on paper questionnaires
Principle 4	Limit line length to decrease the likelihood of a long line of prose being allowed to extend across the screen of the respondent's browser
Principle 5	Provide specific instructions on how to take each necessary computer action for responding to the questionnaire
Principle 6	Provide computer operation instructions as part of each question where the action is to be taken, not in a separate section prior to the beginning of the questionnaire
Principle 7	Do not require respondents to provide an answer to each question before being allowed to answer any subsequent ones

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Table 1 (continued)

Principle	Description
Principle 8	Construct web questionnaires so that they scroll from question to question unless order effects are a major concern, large numbers of questions must be skipped, and/or mixed-mode survey is being done for which telephone interview and web results will be combined
Principle 9	When the number of answer choices exceeds the number that can be displayed on one screen, consider double-banking with appropriate navigational instructions being added
Principle 10	Use graphical symbols or words that convey a sense of where the respondent is in the completion progress, but avoid ones that require advanced programming

Note: Excerpts compiled from Dillman, Tortora, Bowker, 1998, pp. 1-12.

aspect of responding, as well as the technical user friendly interface between computer and respondent (p. 2).

In other words, they claimed that respondent-friendly design would give each participant an equal opportunity to access, understand, and respond to the questionnaire, and it would eliminate questionnaires that are difficult to understand, require highly technical software and/or hardware, and embarrass people.

In addition, respondent-friendly questionnaires seek to eliminate the four main sources of survey error (Sample, Coverage, Measurement, and Nonresponse) that plague low quality surveys, through the integration of three main components of the 11 design principles (Dillman, Tortora, & Bowker, 1998). These three components take into account hardware, software, transmission, computer logic, survey logic, and mixed mode issues and limitations (Dillman, Tortora, & Bowker).

*Response Rates.* Early research indicated lower reported response rates for Internet surveys than other survey modes; however, some studies show the difference in response rates as not significant. In 1999, Sheehan and Hoy summarized 11 previous studies, conducted from 1986 to 1998, that compared Internet surveys to mailed surveys. They reported several studies produced higher response rates for Internet surveys (see Kiesler & Sproull, 1986; Parker, 1992). Conversely, other studies, according to Sheehan and Hoy, indicated that using the US mail to deliver the questionnaires produced higher response rates (see Schuldt & Totten, 1994; Tse, et. al., 1995).

In 1998 Schaefer and Dillman published a similar comparison. Summarizing studies from a comparable time-

frame, 1986-1997, they reported converse results from Sheehan and Hoy (1999). They noted the only study producing higher response rates for Internet surveys was a study conducted by Parker (1992). Other studies reported lower response rates for Internet surveys (Schuldt & Totten, 1994; Kittleson, 1995; Bachmann, Elfrink, & Vazzana, 1996; Couper, Blair, & Triplett, 1997).

Survey researchers are still worried about lower response rates. In 2002, Shannon and Bradshaw surveyed a sample of university faculty from the Mid-South Educational Research Association. They compared response rates and times between Internet and mailed surveys. Their results were comparable to previous studies reporting lower response rates for Internet surveys. They reported the response rate for Internet surveys was half of the mailed survey (44% mailed and 22% Internet).

However, there is published research that supports the design and hypothesis of this study. In 2003, Carini, Hayek, Kuh, Kennedy, and Ouimet surveyed a single campus student population. They reported virtually no differences between Internet and mailed surveys. Another single campus study by Kaplowitz, Hadlock, and Levine (2004) produced similar results. They suggested in populations that are

homogeneous in respect to Internet access that Internet surveys can produce results comparable or higher to mailed surveys.

More recently, the literature reported a shift from straightforward comparisons of mail versus Internet delivery modes to studies adapting a third comparison using mixed-mode designs (Porter & Whitcomb, 2003; Leeuw, 2005; Meckel, Walters, Baugh, 2005; McCabe, Diez, Boyd, Nelson, & Wietzman, 2006). Survey researchers rely on mixed-mode designs to overcome operational shortcomings within single mode deliveries. In an eight campus study, McCabe, Diez, Boyd, Nelson, and Wietzman compared mailed and Internet delivery modes to mixed-mode deliveries. They found comparable response rates to the mail delivery mode only when using the mixed-mode design. This shift validates a continued trend of lower response rates using the Internet delivery mode, and the importance of studying Internet survey methodologies.

### *Topic Saliency*

The survey topic is very important to survey researchers. According to Tourangeau, Rips, and Rasinski (2000), the survey topic plays an important role in the

participants' desire to complete and return the questionnaire. The term saliency refers to the participants' interest in taking the questionnaire and not the sensitive issues within the questionnaire (Tourangeau, Rips, & Rasinski).

In 2000, Groves, Singer, and Corning offered a theory on saliency. They proposed that a participant's willingness to complete and return a survey is directly related to the overall importance given to the survey. They titled this theory the Leverage-Saliency Theory. This theory states that the participant will place importance on the survey topic according to the influences presented at the time of delivery. For example, some participants may be genuinely interested in the survey topic while others may complete and return the survey because of a perceived reward/incentive, trust in the researcher, effect on their personal well being or other motivating variables.

Groves, Singer, and Corning (2000) noted one important aspect of Leverage-Saliency Theory is the ability to speculate about research design and the ability to replicate designs. For example, does the content of the survey affect the response rate of the survey or do other factors, such as pre-notice letters, incentives, and

follow-up letters, explain the willingness to participate.

Leverage-Saliency Theory does not generalize to all participants, but, rather, predicts that the effects of leverage and salience will differ among participants (Groves, Singer, & Corning).

These differences predict the degree of participants overrepresented within the study is a direct correlation to the topic of interest and a function of topic saliency (Groves, Presser, & Dipko, 2004). In other words, participation of the respondent is related to the attitude towards the topic and the other factors (e.g. pre-notice, incentive etc.) within the survey design at the time of the receipt of the survey instrument (Groves, Presser, & Dipko, 2004).

## CHAPTER 3

## METHODOLOGY

This descriptive, cross-sectional study compares and analyzes the differences in response rates and response times using traditional paper and pencil mailed survey methodologies and newer Internet methodologies in a representative sample of student respondents. A second purpose was to identify respondent reported reasons why the sample participants choose not to respond to mailed and Internet surveys. The survey instrument was self-administered, serving a dual purpose. The first purpose measured respondent perceptions of campus technology usage. The second purpose was to increase salience and inclusion in the study (Sheehan, 2001). Controlling the salience, thereby increasing inclusion in the study, lowers the chance of measurement error (Sheehan, 2001; Salant & Dillman, 1994). Equally important, topic salience, according to Groves, Dillman, Eltinge, & Little, (2002), is particularly important in controlling statistical biases relating to unit nonresponse. The questionnaire design was developed using literature in the field and information

gathered from college administrators. Questions were relevant to the instrument topic. A pilot study was conducted to ensure the validity and reliability of the survey instrument.

### *Sample*

The homogeneity of the student population at Tusculum College (sampling frame), along with the heterogeneity of students' diverse beliefs gave the study the distribution of characteristics necessary to collect data for the purpose of answering the research questions. The population of this study consisted of undergraduate, full-time students at a small, private, religiously affiliated liberal arts institution of higher learning, Tusculum College. It is not cost effective or time efficient to attempt to survey the whole population, a total of approximately 2,600 students. For this reason, the survey sample was identified using stratified random sampling techniques. Stratified random sampling is useful in reducing sampling error associated with survey research (Patten, 2002). The strata included two subsets. Subset one represented students from the traditional age program (n=124), while subset two represented students from the

non-traditional program (n=276). The most resourceful and convenient access to a university population is through the university registrar's student information system. Student information databases provide instant access to student names, e-mail addresses, and other demographic information without soliciting this information on the survey instrument. This information is readily available for general use (e.g. student directories). However, to help ensure efficiency for this study, it was important to obtain electronic access to the population list. Visual basic FoxPro assisted in the stratification of the population list.

Purposive or judgmental sampling was used in the nonresponse study. Purposive sampling provides proper selection techniques when a particular group of people have an attribute or trait needed in the study (Nardi, 2003). In the nonresponse study, those who did not respond to the survey instrument met the criterion eligible for inclusion in the study. After all nonresponders were identified, final selection for the nonresponse study used stratified random sampling to identify interviewees.

Because of the overall size of the population, a minimum of 400 students were solicited to participate in

the survey (276 in the adult subset and 124 in the traditional subset). A sample size of 400 was sufficient in reducing sampling error. Understanding the heterogeneity of the population by using a 50/50 split, approximately 330 returned surveys were needed to make estimates of the population portion (P) with a 95% confidence level (Salant & Dillman, 1994; Dillman, 2000; Leedy & Ormrod, 2001).

### *Data Collection*

According to Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau (2004), the methods of survey data collection are critical in collecting data that are nonbiased and are appropriate for supporting the purpose of the study. They cautioned the term "data collection" is loaded and implies that the data already exist; however, they are quick to point out many survey data are produced at the time of solicitation. For this reason it is critical in strategizing the most appropriate data collection modes (Groves et al.).

The data collection protocol for the response rate/time study was subdivided into two subgroups using mail and web survey methods. The nonresponse study used telephone interviews. The solicitation of both subgroups

followed the "tailored-design" approach developed by survey researcher Don Dillman (2000). The tailored-design approach employs several principals designed to increase participation in the study (Table 2). It is important to note that all subgroups received the same "tailored-design" treatments. By applying the same design principles to all subgroups, the researcher can more accurately control internal validity associated with the independent and dependent variables. In addition, the reliability of the instrument increases by standardizing the administration of the survey instrument (Leedy & Ormrod, 2001).

#### *Solicitation Process*

Solicitation of survey populations using the *Tailored Design Method* for mail and Internet surveys is widely accepted and recognized in the literature. Dillman (2000) reported five elements needed for successful response rates: (a) quality questionnaire, (b) the possibility of up to five contacts with the participants, (c) stamped return envelope, if applicable, (d) personalized contacts, and (e) incentives. Several strategies for soliciting the Internet and mail subgroups, which Dillman refers to as principles, were implemented.

Table 2

*Dillman's Survey Process*

Process	Description
Process A.	Tailored Design is the development of survey procedures that create respondent trust and perceptions of increased rewards and reduced costs for being a respondent, which take into account features of the survey situation and have as their goal the overall reduction of survey error.
Process B.	Social exchange and respondent behavior: Actions are motivated by the return of these actions are expected to bring and in fact, usually do bring, from others. The likelihood of responding to the request to complete a self-administered questionnaire, and doing so accurately, is greater when the respondent trusts that the expected rewards of responding will outweigh the anticipated costs.
Process C.	Many aspects of questionnaire and implementation process can be shaped to create trust and influence the respondent's expectations for rewards and costs.
Process D.	Exchange concepts must be communicated visually (rather than verbally) through the use of visual principals for the development of questionnaire and implementation materials.
Process E.	Knowledge of survey population, sponsorship, and survey content must be considered in order to develop the most effective means for increasing rewards, reducing costs, and establishing trust.
Process F.	Successful Tailored Design seeks to reduce survey errors from coverage, sampling, measurement, and nonresponse.

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Note: Modified from Dillman, 2000, p. 27.

In accordance with the survey design, randomly selected participants were chosen to complete the survey instrument by their college e-mail account or through regular U.S. or campus mail.

*Strategy 1.* Utilize multiple contacts (Dillman). Each subgroup received up to three contacts:

- a pre-notice letter or e-mail (Appendix A),
- cover letter and questionnaire (Appendices B, C, & D),
- reminder notice that included a questionnaire or link to the web-survey (Appendix E).

*Strategy 2.* Personalize all contacts (Dillman).

Randomly selected participants who received the survey instrument through e-mail received a personalized electronic cover letter serving as the studies pre-notice. Those selected to receive the survey instrument through U.S. mail or campus mail received a standard letter pre-notice. The personalized cover letter provided a brief overview of the study. In this instance, the participants were asked to participate in a study concerning campus technology usage and fees at Tusculum College. It was necessary to inform the participants of this topic instead of the main purpose of the study to avoid unwanted "social"

participation. Responses based on social desirability are likely to negatively affect the results of the study (Tournageau, Rips, & Rasinski, 2000). In addition, the personalized cover letter provided information on how to contact the researcher. Multiple contact information for the researcher (e.g. two e-mail addresses and two phone numbers) was given to the participants to avoid unwanted technological setbacks.

Because of the importance anonymity and confidentiality have on internal validity, every effort to maintain confidentiality of the participants was made. Given the ability to track information using electronic sources, promising complete anonymity was beyond the scope of this study. However, the insensitive nature of the survey instrument was adequate to control concerns of anonymity (Schaefer & Dillman, 1998). Once the survey was submitted electronically, the researcher was the only person with view access.

In addition to the personalized cover letter, one reminder contact was sent following the "tailored-design" principals. This study employed the use of multiple contacts in an effort to produce higher response rates (Dillman, 2000). All follow-up contacts were personalized

in accordance with Dillman's recommendations and included a replacement questionnaire. Replacement questionnaires considered the multiple aspects of e-mail usage and were used to complement the normal reminder letter (Schafer & Dillman, 1998).

*Strategy 3.* Standardize the questionnaire for both delivery modes (Dillman). Special consideration for the construction of the Internet questionnaire was discussed. Recommendations from the literature emphasized many of the same design elements for paper and pencil surveys apply to Internet based surveys (Dillman, 2000). Because of this, the questionnaire content was the same for Internet participants and paper and pencil participants.

#### *Instrumentation*

This study employed the use of one instrument. The primary purposes of the survey instrument, in accordance with this study, were to increase salience and inclusion in the study (Sheehan, 2001) and to measure student perceptions of campus technology usage. Because of the non-sensitive nature of the survey instrument, anonymity bias was not a large concern for this study. However, this

study did address the concern of the dual nature of the survey instrument during the follow up nonresponse study.

The design of the instrument was developed using literature from the field and from information collected from college administrators. A pilot study tested the validity of the instrument and is reported later in the chapter.

#### *Construction of the Survey Instrument*

Especially important to the survey instrument (see Appendices C & D), the design of the questionnaire, both in question wording and appearance, had a profound impact on the respondents willingness to complete the form. If survey questions are difficult to understand, vague, or contain syntactic or grammatical errors, and if the appearance of the questionnaire is too bold or difficult to follow, respondents may skip the question or worse, refuse to complete and return the entire questionnaire (Dillman, 2000; Tourangeau, Rips, & Rasiniski, 2000).

Construction of the survey instrument followed recommendations from Dillman's (2000) *Tailored Design Method of Mail and Internet Surveys*. *Tailored Design* employs three main design features intended to motivate

participates to respond to the questionnaire. These design features seek to establish trust, to reduce costs, and increase rewards. As a whole, all three seek to lower errors associated with nonresponse, measurement, coverage, and sampling. The use of *Tailored Design* for this study places particular importance on the method of delivery of the survey instrument and not the subject matter of the instrument itself.

Questions were grouped, ordered, and paired in a way to avoid unwanted distractions (Dillman recommends the most salient to the least salient). The most general and easy to answer questions were grouped first in a section called "Demographics". Questions 1-5 represented the demographic section of the questionnaire. These questions were designed to gather information about the enrollment level, major, age, gender, and race of the participant. These demographic questions are vital in answering research question three: How do response rates and response times differ by demographic characteristics such as age, gender, race, and academic major?

Section two of the questionnaire asked questions concerning technology usage. These questions were designed from a review of the literature and from College

administrators. Questions 6-8 solicited information concerning student access to personal computers. Cognitive based questions 9 and 10 contained multiple answer stems that required participants to respond to all answers. These questions explored the usage of computer applications and hardware resources for class assignments. The last section of the questionnaire, section three, asked questions relating to student fees. These questions asked participants to report opinions to three separate items, all grouped in question 14.

#### *Survey Validity: Content and Construct*

In order to ensure the validation of the survey instrument, face, content, and construct tests were used to check the questionnaire. The first test used face validation and consisted of a small quasi-pilot study from a sample of the survey population. Pilot studies are a good way to ensure face validation, but also allows the researcher time to uncover flaws and biases within the survey instrument (Babbie, 1990). The pilot study for this research project was conducted to better understand the following areas: (a) the ease of completion of the survey instrument by representatives from the sample frame, (b)

the format and construction of the survey instrument, and (c) the wording and appearance of the questions.

Those who participated in the pilot study recommended a few minor changes, but, overall, found the ease of completion satisfactory. College administrators, including the instructional technology division, recommended content changes. Construct validity was determined by this researcher's dissertation committee, who through experience and knowledge, further reviewed for recommendations.

#### *Telephone Interview Process*

In order to identify participant reported factors for survey unit nonresponse, telephone interviews were conducted after the ending date for questionnaire return. The questionnaire was coded and marked so the researcher could identify those in the sample who chose not to respond to the questionnaire. The criterion for admissions into this study was nonresponse; that is, those who chose not to respond to the questionnaire. Because the sample of nonresponders was large (over 200), a selection process for participation was used. Nonresponders, categorized by the questionnaire strata, were selected using stratified random sampling.

The telephone interview protocol is as follows

(Salant & Dillman, 1994):

1. A questionnaire cover page was used to ensure accuracy of the researcher (Appendix F). Those selected to participate received up to three contacts. The date, time, and call number were listed on the cover page.
2. In preparation for questions from the interviewees, the researcher drafted and completed sample questions that participants may ask the interviewer (Appendix G).
3. Follow the procedures outlined by Salant & Dillman (1994) as the "Basics of Proper Interviewing".

Participants were asked open-ended and close-ended questions (Appendix H). Salant and Dillman (1994) described two types of telephone interview questions. The former asks questions that encourages the respondent to express reasons and feelings about the subject matter (Salant & Dillman). The latter asks respondents to choose from interviewer determined categories (Salant & Dillman). Each question, read slowly and verbatim to the participants, was given the same attention with no substitutions, skips, or additions (Salant & Dillman).

### *Data Analysis*

Data analysis for the first three research questions was conducted using statistical software (SPSS):

1. To what extent do response rates differ between Internet survey methods and mailed survey methods?
2. To what extent do response times differ between Internet survey methods and mailed survey methods?
3. How do response rates and response times differ by demographic characteristics such as age, gender, race, and academic major?

This analysis used data obtained from the survey and involved descriptive statistics (frequency distribution and various measures of central tendency), and other nonparametric tests. In addition, an independent sample *t*-test was computed to assist with the analysis of research question 2. All statistical tests were analyzed at the  $\alpha = .05$  level.

Data analysis for research questions 4-6 was conducted by organizing and coding telephone interview data and using SPSS to analyze the survey data:

4. What are the factors that make student participants choose not to respond to Internet surveys?

5. What are the factors that make student participants choose not to respond to mailed surveys?

6. To what extent does the content of the survey instrument influence participant response?

Because the interview data impacted multiple research questions, both data sets (survey and interview) were merged together to answer Research Questions 4-6.

Compiling the data in this manner allowed for a continuous analysis of individual Research Questions.

### *Summary*

The researcher-designed questionnaire was sent to the participants during the spring semester of 2006. Four hundred participants were chosen from a stratified random sample of 2600 students at Tusculum College. Follow-up interviews were conducted with 30 participants that did not complete and return the survey questionnaire. Data were analyzed to determine the differences in response rates and response times to mail and Internet delivery modes.

Additionally, interview data were coded and analyzed to determine the factors of unit nonresponse on mail and Internet delivery modes.

## CHAPTER 4

## DATA PRESENTATION AND ANALYSIS

The purpose of this study was to compare and analyze the differences in response rates and times using traditional paper and pencil mailed survey methodologies and newer Internet methodologies with a representative sample of student respondents. A second purpose was to identify respondent reported reasons why the sampled participants choose not to respond to mail or Internet surveys.

This chapter reports the results of the mode comparison study and the follow-up nonresponse study. This chapter is divided into three sections: (a) a summary of the study, (b) a report on the data analysis of the six research questions, (c) and a summary of the chapter.

*Summary of the Study*

The population for this cross-sectional study consisted of higher education students at a private, Christian college in the Southeast. The sampling frame consisted of two subsets and was identified using

proportional stratified sampling techniques. Two modes of data collection were used to deliver the researcher-designed questionnaire during the response rate/time study. Participation was solicited following a modified version of the *Tailored Design Method* (Dillman, 2000). Telephone interviews were used to collect data for the nonresponse study. The questionnaire and the telephone interviews were designed to answer the following research questions:

1. To what extent do response rates differ between Internet survey methods and mailed survey methods?
2. To what extent do response times differ between Internet survey methods and mailed survey methods?
3. How do response rates and response times differ by demographic characteristics such as age, gender, race, and academic major?
4. What are the factors that make student participants choose not to respond to Internet surveys?
5. What are the factors that make student participants choose not to respond to mailed surveys?
6. To what extent does the content of the survey instrument influence participant response with out regard to mode?

### *Overview of the Survey Results*

Four hundred questionnaires were sent to a random sample of student participants during the Spring semester of 2006. Questionnaire delivery was consistent with the

design of the study with both subsets receiving mailed paper and Internet based instruments. Data collection lasted approximately four weeks for the questionnaire and two weeks for the follow-up interviews. The results of the response rate and time study follow.

The overall response rate for both survey delivery modes (mail and Internet) and both subsets (hereafter referred to as Traditional and Adult) was 26.5% (n=106), based on the initially solicited sample size of 400 (Table 3). Adjusting the response rate to exclude incorrect addresses (both e-mail and postal), the adjusted overall response rate was 26.84% (n=106), based on an adjusted sample size of 395. In comparison with other studies (Kaplowitz, Hadlock, & Levine, 2004), the results of this research yielded a low amount of incorrect addresses indicating a less restrictive population sample. All e-mail addresses for the traditional subset were valid. One mailed questionnaire was returned undeliverable from the traditional subset.

This questionnaire was returned after the pre-notice and initial survey were mailed. This indicated the recipient changed addresses within the data collection time period.

Table 3

## Overall Response Rates

	Traditional		Adult		Overall		
	E-Mail	Mail	E-Mail	Mail	E-Mail	Mail	
Sample Size	62	62	138	138	200	200	400
Bad Address	0	1	1	3	1	4	5
Bad Address %	0.00%	1.61%	0.72%	2.17%	0.50%	2.00%	1.25%
Adjusted Sample Size	62	61	137	135	199	196	395
Questionnaires returned	6	17	14	69	20	86	106
Percentage Returned	9.68%	27.42%	10.22%	51.11%	10.05%	43.88%	26.84%

The adjusted incorrect address frequency and percentage for the traditional subset was 1.00 and 1.61%, respectively.

The adult subset also yielded a low adjusted incorrect address frequency and percentage. The adult subset was classified as non-residential, receiving all mailed questionnaires through their permanent postal account or student e-mail account. One e-mail account returned undeliverable indicating an incorrect address (.72%). Three postal accounts were returned. Because of the low frequency of incorrect addresses, the frequency percentage of incorrect addresses was also very low (2.17%).

To address the concern of possible nonresponse bias due to the low overall response rate, two comparisons of respondent patterns were made. The first compared early responders to late responders, while the second compared respondents to non-respondents. No differences were found across demographic variables used in the study (e.g. enrollment level, age, gender, and race). This indicated the sample approximated to the population segment.

*Analysis of Questionnaire Data: Research Questions 1-3*

Analysis for Research Questions 1-3 used data gathered from the survey questionnaire. The findings for the questionnaire data are reported in the next three sections.

*Data Analysis of Research Question One****To what extent do response rates differ between Internet survey methods and mailed survey methods?***

In the spring semester of 2006, participants were sent a questionnaire asking opinions about Technology Usage and Fees at Tusculum College. The content of the questionnaires was identical for both instruments; however, the appearance of the two instruments was different (Appendices C & D).

The overall response rates for the mailed survey was 43.88% (n=86). The Internet survey yielded an overall response rate of 10.05% (n=20). A chi-square goodness-of-fit test revealed a significant statistical difference ( $\chi^2_{(1)} = 41.094, P < .05$ ) between the observed and expected frequencies of mailed and Internet surveys. Mailed survey response rates for the adult subset was 51.11% (n=69 respondents, N=135 in the sample). Internet survey response rates for the adult subset was 10.22% (n=14, N=137). Mailed survey response rates for the traditional

subset was 27.42% (n=17, N=61). Internet survey response rates for the traditional subset was 9.68% (n=6, N=62). These response rates are similar but lower than a recent study by Shannon and Bradshaw (2002) who reported an overall response rate of 33% (44% for mailed surveys and 22% for Internet surveys).

The frequency distribution table (Table 4) for the total returned questionnaires shows the total number of responses were relative to the proportional stratification of the population, although slightly lower for the traditional and slightly higher for the adult subset. Sixty-nine percent of the sample was included in the adult subset and 31% percent in the traditional subset. A cross-tabulation of the response pattern indicated a similar trend (Table 5). Seventy-eight percent of the questionnaires returned (n=83) were by the adult subset. Twenty-two percent of the questionnaires returned (n=23) were by the traditional subset.

Comparisons of response rates of both mail and Internet surveys were made between the first solicitation of the questionnaire and the follow-up letter (presented here as the first phase and follow-up phase). The first phase yielded an overall response of 73.5 % (n=78) of

Table 4

*Frequency Distribution Table for Mail and Internet Delivery Modes*

	Frequency	Percent	Valid Percen	Cumulative Percent
Mail	86	81.1	81.1	81.1
Internet	20	18.9	18.9	100.0
Total	106	100.0	100.0	

Table 5

*Cross-Tabulation of Response Rates between Survey Delivery Mode and Traditional and Adult Participants*

		Traditional and Adul Participants		
		GPS	Residential	Total
Survey Delivery Mail Mode	Count	69	17	86
	% within Survey Delivery Mode	80.2	19.8	100.0
	% within Traditional and Adult Participants	83.1	73.9	81.1
	% of Total	65.1	16.0	81.1
Internet	Count	14	6	20
	% within Survey Delivery Mode	70.0	30.0	100.0
	% within Traditional and Adult Participants	16.9	26.1	18.9
	% of Total	13.2	5.7	18.9
Total	Count	83	23	106
	% within Survey Delivery Mode	78.3	21.7	100.0
	% within Traditional and Adult Participants	100.0	100.0	100.0
	% of Total	78.3	21.7	100.0

Table 6

*Comparison of Response Rates to Solicitation Phases*

	Mailed	Internet	Test Statistic	P
First Phase	65	13	$\chi^2_{(1)} = 34.60$	<.05
Follow-Up Phase	21	7	$\chi^2_{(1)} = 7.00$	<.05
Overall	86	20	$\chi^2_{(1)} = 41.09$	<.05

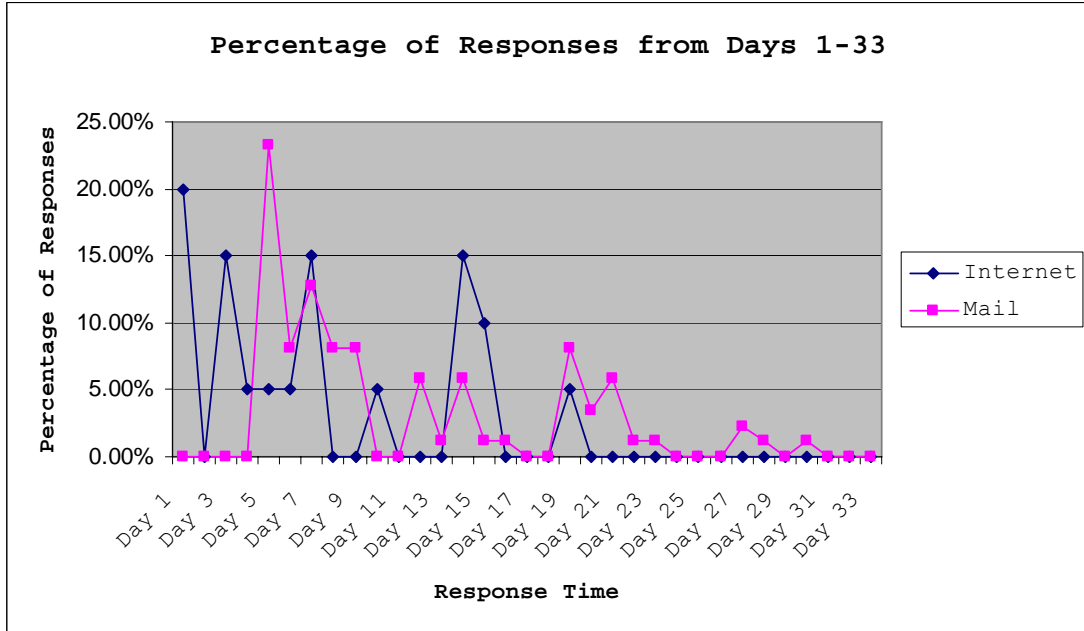
the returned questionnaires. The follow-up phase yielded and overall response of 26.4% (n=28) of the returned questionnaires. Statistically significant differences were obtained when response rates were compared between mail and Internet modes and the first and follow-up phase (Table 6).

*Data Analysis of Research Question Two****To what extent do response times differ between Internet survey methods and mailed survey methods?***

Comparisons of response times between mailed and Internet surveys revealed a similar trend to past studies (e.g. Schaefer & Dillman, 1998; Shannon & Bradshaw, 2002). Internet surveys were found to be returned in a faster time

than mailed surveys, a trend that is opposite of response rates. Forty-five percent of all returned Internet questionnaires were returned before the first mailed questionnaire. Twenty percent of returned Internet questionnaires were sent back the first day (in addition 6 other respondents visited the website the first day and chose not to respond) and 65% were returned within the first seven days. Conversely, the first mailed questionnaire was received five days after the surveys were sent to participants. There were no questionnaires returned the first day, and 44% of the returned mailed questionnaires were received within the first seven days.

The mean time to receive an Internet survey was 7.5 days, while the mean time to receive a mailed survey was 11.2 days. Responses during the first phase of solicitation was higher than the second phase for both data collection modes (Figure 2). The target date for the e-mail reminder and questionnaire follow-up letter was Day 14. Internet surveys returned from Day 1 to 14 represent the first phase in data collection. For the mailed questionnaire, the first phase was Day 1-15. The mailed follow-up letter was sent on Day 14. By using day 15 as



*Figure 2.* Percentage of Completed and Returned Questionnaires by Day.

the cut-off date, it gave more control over mail delivery time.

Seventy percent of all Internet questionnaires were returned within the first phase of data collection. Similarly, first phase return time for the mailed survey was 74%. These results were found to be similar to other studies. Shannon and Bradshaw (2002) found that "the average time required to receive a response from a postal survey was similar at each phase, the response time was much faster for electronic surveys after the initial point of contact" (p. 185).

Findings for the second phase yielded comparable results to the literature. Thirty percent of returned Internet questionnaires were received in the follow-up phase, whereas 26% of mailed questionnaires were returned during the follow-up phase. An independent samples *t*-test comparing the mean scores of the time to return questionnaires found a significant difference between the means of the Internet mode and mailed mode ( $t_{(104)} = 2.293, p < .05$ ). The mean of the Internet group was lower ( $m = 7.5, sd = 5.7$ ) than the mean of the mailed group ( $m = 11.2, sd = 6.7$ ).

*Data Analysis of Research Question Three*

***How do response rates and response times differ by demographic characteristics such as age, gender, race, and academic major?***

Participants were asked to provide demographic data pertaining to enrollment level, age, gender, race and academic major. Although this information was readily available through the registrar's office, these questions were needed to assist with answering Research Question 6. While other studies found statistically significant differences between mail and Internet modes and response rates and times, in terms of age, gender, race, enrollment level, and academic major (Crawford, McCabe, Cooper, & Boyd, 2002), no statistical differences were found analyzing delivery modes individually.

However, various statistical differences were found when examining age, gender, race, enrollment level, and academic major using intra-set data combining both mail and Internet delivery modes. In order to examine the combined data, all responses, grouped by demographics, were merged with both delivery modes to increase the responses in each category. Comparisons were then made.

Question 1 asked participants to indicate their current enrollment level. The frequency distribution Table

7 for Question 1 illustrates some differences in the responses. Seven items gave each participant an opportunity to select a category. Seniors (n= 27, 25.5%) were the most likely to respond, while sophomores (n=12, 11.3%) were the least likely to respond. Twenty-four point five percent of all respondents were juniors (n=26) followed by 20% graduate (n=22) and 17% freshman (n=18).

Over one-half of all respondents reported junior or senior as their current enrollment level. A chi-square goodness-of-fit test revealed a statistically significant difference ( $\chi^2_{(5)} = 27.47, P < .001$ ) in the frequency

Table 7

*Frequency Distribution Table for Responses to Enrollment Level of Respondents*

	Frequency	Percent	Cumulative Percent
Freshman	18	17.0	17.0
Sophomore	12	11.3	28.3
Junior	26	24.5	52.8
Senior	27	25.5	78.3
Graduate	22	20.8	99.1
Special Student/Non-degree seeking	1	.9	100.0
Total	106	100.0	

of participants reporting their enrollment level, indicating the probability is less than 1% the return rate of questionnaires is equally distributed across enrollment level by chance alone. However, analyzing the bivariate frequency distribution between the time to return the questionnaire and enrollment level, a chi-square test of independence found no statistical dependence between time to return the questionnaire and enrollment level ( $\chi^2_{(105)} = 99.68, P > .05$ ).

Question 3 asked participants to report their age. Table 8 shows that 32 respondents (30.2 %) indicated 18-25. Thirty-one (29.2%) respondents reported 26-35. Twenty-seven (25.5 %) participants indicated 36-45. Fifteen (14.2%) responded 46-55, while 1 respondent (.9%) reported 56+.

Table 8

*Frequency Distribution Table for Age of the Respondents*

	Frequency	Percent	Cumulative Percent
18-25	32	30.2	30.2
26-35	31	29.2	59.4
36-45	27	25.5	84.9
46-55	15	14.2	99.1
56+	1	.9	100.0
Total	106	100.0	

A chi-square test for independence ( $\chi^2_{(84)} = 58.44, P > .05$ ) found no statistical dependence between the time to return a questionnaire and the age of the participant. Using the chi-square goodness-of-fit test, a statistical difference was found among the age categories in terms of frequency reported ( $\chi^2_{(4)} = 32.67, P < .05$ ).

Question 4 asked participants to report their gender. The frequency distribution Table 9 for gender shows more females than males responded to the questionnaire. A total of 66 participants (62.3%) reported their gender as female, while 40 (37.7%) reported male.

Using a chi-square goodness-of-fit (single proportion test) because there are only two categories of the variable

Table 9

*Frequency Distribution Table for Gender of the Respondents*

	Frequency	Percent	Cumulative Percent
Male	40	37.7	37.7
Female	66	62.3	100.0
Total	106	100.0	

gender) to test Question 4, a statistically significant difference was found between the male and female categories ( $\chi^2_{(1)} = 6.37, P < .05$ ). Further analysis using chi-square test of independence to cross-tabulate time and gender ( $\chi^2_{(21)} = 26.87, P > .05$ ), found no statistical dependence between the time to return a questionnaire and the gender of the participant. Question 2 asked participants to report their academic major. The frequency distribution Table 10 for academic major illustrates that the majority (53.8%) of the respondents reported organizational management as their current major, while 14.2% (15) reported elementary education as a major. No other major had more than 3.8% reported. Approximately 9.0% failed to respond. No substantial differences were found in the return time and rates of the questionnaire with regards to academic major.

Question 5 asked participants their race. The frequency distribution Table 11 for ethnicity shows an overwhelming majority reported race as Caucasian/white (n=95, 89.6%).

The overall population for this study was 90% Caucasian. These results reflect the proportional sample of the population. No differences were found within this demographic in regards to response time and rate.

Table 10

*Frequency Distribution Table for Current Major of the Respondents*

Major	Frequency	Percent
Organizational Management	57	53.8
Elementary Education	15	14.2
Human Resource Development	4	3.8
Pre-Pharmacy	3	2.8
Others	18	16.9
Non-Response	9	8.5
Total	106	100

Table 11

*Frequency Distribution Table for Ethnicity of the Respondents*

	Frequency	Percent
Native American	1	.94
Asian/Pacific Islander	2	1.89
Caucasian/White	95	1.00
African American/Black	5	2.00
Hispanic/Latino	2	1.89
Other	1	.94
Total	106	100.0

*Analysis of Compilation Data: Research Questions 4-6*

Data Analysis of Research Questions 4-6 used compilation data obtained from the survey questionnaire (n=106) and the telephone follow-up interviews (n=20). These data were merged together to maintain a continuous flow of analyses of the Research Questions.

*Data Analysis of Research Question Four****What are the factors that make student participants choose not to respond to Internet surveys?***

Survey Question 13 asked students how often they check their College e-mail account. The frequency distribution for overall responses indicated 50% rarely or never check their College provided e-mail account (Table 12). Twenty-nine percent indicated a routine check of the account (daily or often). Approximately 22% reported that they check their e-mail account 3-4 times per month. Of the 29 % that indicated a routine check, the majority (66%) is the percentage within the traditional subset, indicating the adult subset rarely or never checked their e-mail account. Combining Question 13 with the traditional and adult subset, the chi-square ( $\chi^2$ )

Table 12

*Frequency Distribution Table for Responses to I check my Tusculum College E-Mail Account*

	Frequency	Percent	Cumulative Percent
Rarely (1-2 Times a Semester)	22	20.8	20.8
Sometimes (3-4 Times a Month)	22	20.8	41.5
Often (3-4 Times a Week)	22	20.8	62.3
Daily (at least once a day)	10	9.4	71.7
Never	30	28.3	100.0
Total	106	100.0	

test for independence indicated a statistically significant observed value ( $\chi^2_{(4)} = 18.638, P < .05$ ). Further analysis using the chi-square ( $\chi^2$ ) test for independence revealed the distribution of responses for Question 13, combined with the delivery mode, were statistically significant at the  $p < .05$  level. The  $\chi^2_{critical}$ , 9.49, was lower than the  $\chi^2_{observed}$  14.821 indicating responses to Question 13 are statistically dependent in some way on the delivery mode. One cell revealed a standardized residual of 3.0, indicating a possible source for the significance (Appendix I). Cells with a standardized residual over 2.0 could indicate a contribution to the significance (Hinkle, Wiersma, & Jurs (1988). In addition, cells with a high percentage of zero counts or cells with counts less than

five may confound the results (SPSS Training Manual, 1994). No other cells revealed any contributing source to the significance.

Questions 6-8 asked participants about their access to a computer at home, work, or the College. One-hundred and two participants (96.2%) reported access to a computer at home. Approximately 3% (n=4) reported no access to a computer at home. One respondent from the Internet delivery mode reported no access to a computer at home. This indicated the respondent completed the questionnaire at work or at the College.

Eighty-four (79%) respondents reported access to a computer at work. Nineteen (18%) reported no access to a computer at work. Three (3%) respondents skipped the question. Thirty-five percent (n=7) of the Internet mode respondents indicated no access to a computer at work. This indicates the respondents completed the questionnaire at home or at the College.

Ninety-nine percent (n=105) of the participants reported access to a computer at the College. Zero (0%) reported no access. One (1%) respondent skipped the question. All respondents from both questionnaire delivery

modes, mail and Internet, reported they had access to computers at the College.

Analysis of interview data indicated support for Research Question 4 (as noted in Chapter 3, interview data is presented here, merged with survey data, to maintain a continuous flow of analyses). Interview Question 4 asked survey non-respondents (those who did not complete the questionnaire) their preference when taking surveys—Internet or mail? Seventy-five (n=15) percent responded that their preferred way to take a survey is through the mail, whereas twenty-five percent (n=5) stated that their preferred way to take a survey is through the Internet. Those that preferred to take a survey by US mail stated that taking surveys through the mail is easier than the Internet. They claimed to have more control over when and where they complete the questionnaire. A few (n=3) reported the “ease and convenience of taking a survey by paper outweighs the Internet because of the complexities with technology and the trouble it brings.”

Others described their preference of mail over Internet surveys as laziness. As one non-respondent stated, “taking a survey by Internet means I have to check my e-mail account. That is something that I do not do

regularly. I am usually too lazy and get mad at all of the spam."

Interview Question 1 asked non-respondents if they remembered receiving the questionnaire. This question was qualified to include "by mail or by e-mail" depending on the mode of delivery used to solicit the participant. Thirteen (65%; all Internet mode) had no memory of receiving the questionnaire. Seven (35%; all mail mode) remembered receiving the questionnaire. When prompted further on why they had no memory, all 13 responded that they did not check their College e-mail account. When asked if this is the reason they did not complete and return the survey (interview Question 3), all 13 responded "yes". One respondent offered an explanation:

I really do not like checking my College account because I have so many others to check. This one becomes a nuisance because of the junk-mail and the fact that I already have two other [e-mail] accounts. As far as I can tell, there is really no good reason for me to take time out of my day to check the College account. So therefore, I do not check it. If by some chance it is required, then maybe I will change my mind.

*Data Analysis of Research Question Five*

**What are the factors that make student participants choose not to respond to mailed surveys?**

Survey non-respondents participating in the telephone interviews (n=20) identified three factors as to why they did not respond (recall from Chapter 3 that purposive selection identified the non-responders from the survey, while stratified random sampling identified the actual call list; 20 interviews were deemed sufficient because the response pattern replicated the data):

1. Time-they were too busy
2. Misplaced the survey
3. Forgot

Some participants elected not to take the survey because of time issues. They felt like the burden of taking time out of their busy schedules was too great. Some thought the questionnaire looked "too long" even though they were told the amount of time it would take to complete the survey. One non-respondent stated, "I started the survey but was called away. I never really came back to it. I thought it may be useful, though." Others simply weighed the cost/benefit for them personally and decided that the

results of the survey would not benefit them enough to complete the questionnaire.

Some non-respondents remembered receiving the survey but misplaced it. One traditional age non-respondent stated:

I remember taking it from my PO Box and opening the letter. I thought it looked useful and had every intention of taking it. I then placed it in my backpack. I have not seen it since. I guess it is still there.

Others non-respondents had similar experiences, claiming receipt of the questionnaire, but no memory of its current whereabouts. One adult age non-respondent blamed the lost questionnaire on his spouse. He stated:

I was out of town on business and remember my wife telling me I had received a letter from you asking me to complete a survey about computers. When I came back to town, I could not find the letter. My wife could not remember where she put it. I guess it will surface sooner or later.

Other questionnaire non-respondents simply claimed to have forgotten about the survey. One non-respondent elaborated, "I received the survey and placed it in my to-

do pile with my other bills. I guess I paid the bills and forgot to take the survey." Others reacted almost apologetic about not taking the survey. They seemed legitimately disturbed by the fact they forgot to complete and return the questionnaire. One non-respondent stated, "Oh no, I forgot to complete the survey. I hope you are not mad at me. I really wanted to do it. I will complete it right away."

#### *Data Analysis of Research Question Six*

##### **To what extent does the content of the survey instrument influence participant response?**

Interview Question 2 asked questionnaire non-respondents if the survey topic was interesting enough to complete and return the survey. Ten (50%) interviewees reported the survey topic was interesting. Five (25%) reported some interest, whereas two (10%) stated no interest at all. Three (15%) participants wanted to read the full questionnaire before deciding. A follow-up question to Interview Question 2 asked "why" they think the survey topic was interesting. The number one response was, "because I am a student at the College". One interviewee stated:

I think the topic is important because it implies that you are looking for ways to improve opportunities for students. I will not be here, I am graduating in May, but someone will get the benefit. That is all that really matters.

Another person responded, "I did not take the survey because I was busy and placed it on the back-burner. It really had nothing to do with the topic of the survey. I think the topic is good." Others agreed, stating that their school workload coupled with outside activities and other responsibilities had more to do with not responding to the questionnaire than the topic of the survey. Another respondent answered, "I am just a freshman, so I would have a lot at stake by this topic. It really concerns me. If I would have checked my e-mail account more, I would have taken the survey."

Survey Questions 14a-c asked respondents their opinion concerning student fees. In particular, it asked if participants felt like student fees were important to College programs. In addition, Question 14a-c asked whether student fees are a good way to maintain and enhance computer labs and computer services. This survey question was closely related to Leverage-Saliency theory.

When asked the importance of student fees, Question 14a, 52.8% (n=56) strongly agreed or agreed that student fees are important to College programs (Table 13). Twenty-seven percent (n=29) gave no opinion concerning the importance of student fees.

Survey Question 14b asked participants if student fees were a good way to maintain computer labs and computer services (Table 14). Fifty-seven percent (n=61) reported that they strongly agreed or agreed that student fees were a good way to maintain computer labs and services. Approximately 26% (n=27) did not have an opinion. Fifteen percent (n=16) strongly disagreed or disagreed. Two percent (n=2) did not answer the question.

Question 14c asked if student fees were a good way to enhance computer labs and computer services (Table 15). Fifty-four percent (n=58) strongly agreed or agreed. Twenty-four percent (n=26) had no opinion.

Twenty-nine percent (n=20) strongly disagreed or disagreed, while 2% (n=2) did not answer the question.

Table 13

*Frequency Distribution Table for Responses to Student Fees are Important to Tusculum College Programs*

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agree	19	17.9	17.9
	Agree	37	34.9	52.8
	Neither Agree or Disagree	29	27.4	80.2
	Disagree	12	11.3	91.5
	Strongly Disagree	7	6.6	98.1
	Skip	2	1.9	100.0
	Total	106	100.0	

Table 14

*Frequency Distribution Table for Responses to Student Fees are a Good Way to Maintain Computer Labs*

		Frequency	Percent	Cumulative Percent
	Strongly Agree	19	17.9	17.9
	Agree	42	39.6	57.5
	Neither Agree or Disagree	27	25.5	83.0
	Disagree	10	9.4	92.5
	Strongly Disagree	6	5.7	98.1
	Skip	2	1.9	100.0
	Total	106	100.0	

Table 15

*Frequency Distribution Table for Responses to Student Fees  
are a Good Way to Enhance Computer Labs*

	Frequency	Percent	Cumulative Percent
Strongly Agree	22	20.8	20.8
Agree	36	34.0	54.7
Neither Agree or Disagree	26	24.5	79.2
Disagree	15	14.2	93.4
Strongly Disagree	5	4.7	98.1
Skip	2	1.9	100.0
Total	106	100.0	

### *Data Presentation and Discussion*

This section presents the major findings of the data analysis:

1. Comparable response rates between mailed and Internet surveys were not found. Mail surveys were found to be returned at a much higher response rate than Internet surveys. While this finding is consistent with studies whose populations were heterogeneous (e.g. Couper, Blair, & Triplett, 1997), studies whose distribution of characteristics were similar found opposite results (Kaplowitz, Hadlock, & Levine, 2004). Comparison of response rates between subsets was also consistent with the overall response rate findings. The mail delivery mode was found to be returned more often than the Internet mode regardless of the subset (traditional or adult age student).

2. Because all members of this population received a College provided e-mail address, coverage error was not a problem. Adjustments for incorrect e-mail and postal addresses were minimal. This indicated the population was less restrictive than other populations (see Kaplowitz, Hadlock, & Levine, 2004). It also supported findings from

Crawford, McCabe, Cooper, and Boyd (2002) that US postal addresses were much more likely to be incorrect than e-mail accounts (within special populations). However, it differed from other studies whose populations were not provided an e-mail account. It is clear, though, that opportunities exist within this population to increase contact with participants.

3. Comparisons of response rates and times between the first phase and follow-up phase of the questionnaire delivery resulted in mixed findings with previous studies. This study found that response rates were higher during the first solicitation of the survey instrument for both delivery modes, while response time was similar for US postal at each phase, but slightly lower for the Internet mode during the follow-up phase. These findings were in contrast to Shannon and Bradshaw (2002) who found that response time was faster for Internet surveys during both phases.

4. Results for this study showed that response time to complete and return the questionnaire for the Internet delivery mode far outpaced the mailed delivery mode. In short, completed questionnaires came in more quickly for the Internet mode. Almost one-half of all returned

Internet questionnaires were received before the first mailed questionnaire. Participants responding to the Internet surveys did so almost immediately during the first of solicitation. This is a little confounding because of the infrequent checks of the College provided e-mail account. However, it does support previous findings within the literature (e.g. Crawford, McCabe, Couper & Boyd, 2002; Schaefer & Dillman, 1998; Shannon & Bradshaw, 2002).

5. Using a Chi-square goodness-to-fit test, statistically significant differences were found between the expected and obtained frequencies comparing demographic data to participant responses. This finding was consistent with other research reported in the literature (Crawford, McCabe, Couper, & Boyd, 2002) and was consistent with the make-up of the population understudy. Data analysis revealed higher response rates from Caucasian women studying organizational management. Consistent with the overwhelming majority of this population, whose distribution of characteristics hold true, the only demographic data not consistent with the overall population was age. The average age for the overall population falls into the 26-35 age category. However, response rates for respondents were almost equal across three age categories,

only differing at the higher end of the age level. While response rates were statistically significant making good-fit decisions, response times were not found to be statistically significant among demographic characteristics.

6. Overall respondent burden was minimized and found not to be an issue within the mail delivery mode. Conversely, the Internet delivery mode experienced a high amount of respondent burden. Within the mail delivery mode, nonrespondents reported differing factors of nonresponse from the Internet delivery mode. Those who chose not to respond to the mail delivery mode did so because of time constraints, lost, or forgotten questionnaires. Non-respondents from the Internet delivery mode reported the burden to check their College provided e-mail account was too great. Therefore, those participants never knew they were being solicited for a survey. As a result, response rates for the Internet delivery mode were lower than the mailed delivery mode. While the factors for nonresponse within the mail delivery mode are consistent with previous research (Crawford, McCabe, Couper, & Boyd, 2002), findings for the Internet mail mode seem unique to this population.

However, Crawford, McCabe, Couper and Boyd (2002) did find one similar factor within the Internet mode. In their research, they found the Internet mode was much more likely to have non-respondents that never knew they were sent a questionnaire. However, their research does not link this with respondent burden of checking the College provided e-mail account.

7. The last research Question asked, "To what extent does the content of the survey instrument influence participant response?" It is important to note that the methodology of this research does not report on the design and appearance of the survey instrument (which varied slightly between the paper and electronic versions). It did, however, use Topic Saliency Theory as a guide to developing the survey instrument. As we recall from Chapter 3, the survey served a dual purpose: (a) to solicit opinions concerning Technology Usage and Fees (it was determined to provide this topic to the participants to avoid any unwanted social desirability responses), and (b) to provide a salient topic that would be of interest to all respondents.

Data analysis would seem to validate the decision to use Technology Usage and Fees as a topic of the survey

instrument, while declining to tell the participants the true purpose of the study. However, data analysis revealed no support for the Leverage-Saliency Theory that helped shape the design of the study. This theory states that the participant will place importance on the survey topic according to the influences presented at the time of delivery (Groves, Singer, & Corning, 2000). Although the logic of Leverage-Saliency Theory is sound, it did not fit for this population understudy.

Data analysis revealed a genuine interest in the survey topic. Many of the nonrespondents (when asked in follow-up interviews) reported the survey topic was interesting enough to complete and return the survey. Other factors, however, contributed to nonresponse. These factors led to the lower response rates, especially within the Internet delivery mode.

#### *CHAPTER SUMMARY*

The purpose of this study was to compare and analyze mail and Internet delivery modes for surveys. Additionally, this study reported on factors that make people not respond to surveys. A total of 106 questionnaires were collected, and 20 telephone interviews were conducted with a sample of questionnaire non-

respondents. The data analysis indicated that participants were more likely to complete and return the mailed questionnaire rather than the Internet questionnaire. Statistical differences in the overall response rates between mail and Internet modes were found. The overall response rate for the mail mode was 43.88 %, while the overall response rate for the Internet mode was 10.05%. The amount of time to receive a completed and returned questionnaire was also found to be statistically significant. The mean time to receive a questionnaire by Internet was 7.5 days, while the mean time to receive a questionnaire by mail was 11.2 days.

Data analysis of the telephone interviews provided reasons as to why participants chose not to respond to the questionnaire. Those participants who received the questionnaire through the mail remembered receiving the survey but cited three factors as to why they did not complete and return the survey. The greatest influence was time. Next, they cited misplacing the survey. The last factor they reported was forgetting to complete the survey.

For the Internet mode, most non-respondents that were interviewed reported they had no memory of receiving the

questionnaire. The reason for this is that they rarely or never checked their College e-mail account.

## CHAPTER 5

## SUMMARY, CONCLUSIONS, RECOMENDATIONS

*Summary*

This descriptive, cross-sectional study compared and analyzed survey response rates and times using two delivery modes to administer the questionnaire; (a) first class US postal mail and (b) e-mail delivered Internet based instruments. A second purpose sought to identify factors of questionnaire unit nonresponse. With the rise of increased Internet usage in American households and College campuses, it is clear that empirical research needed to be conducted to examine the differences in response rates and times of mail and Internet surveys.

Since the late nineteenth century, fundamental changes in social science inquiry guided the enlightenment of expanded survey methodologies and improved statistical analysis. This shift gave way to new understandings of sampling methodologies that, subsequently, furthered improvements of survey research. It allowed a move from total enumeration of populations to population representation using statistical probabilities of representative samples (Biemer & Lyberg, 2003).

In the years to follow, survey bias and sampling error became increasingly important for researchers to control, especially nonresponse. Although there are many different theories concerning nonresponse bias, this study reviewed nonresponse as it relates to the design of the study and the topic of the instrument. Data collection followed recommendations from Dillman's (2000) *Tailored Design Method of Mail and Internet Surveys* for self-administration of survey questionnaires. Leverage-Saliency Theory (Groves, Singer, & Corning, 2000) was used to guide development of the survey instrument and to assist with the development of the interview questions.

The results of this study are based upon a self-administered questionnaire that was sent to a random sample of College students during the spring 2006 semester. Using two delivery modes for the survey instrument (mail and Internet), a total of 106 questionnaires were returned for an overall response rate of 26.84% (43.88% for the mail mode and 10.05% for the Internet mode). These results were found to be consistent with other similar studies (Shannon & Bradshaw, 2002). Data analysis for response rates indicated statistically significant differences between mail and Internet delivery modes. Further data analysis on

response time revealed statistically significant differences between the means of both delivery modes. Although various statistical differences were found cross-tabulating response rates with age, gender, race, enrollment level, and academic major and with combining mail and Internet delivery modes, data analysis demonstrated no statistical differences when cross-tabulating these demographics with response time.

Interview data along with item analysis for questions 13 and 14 revealed reasons why participants choose not to respond to surveys. An overwhelming majority of those interviewed reported respondent burden was too high in checking their College provided e-mail account. Therefore, these respondents had no memory of receiving the questionnaire. Analysis of questionnaire item 13 further supported the interview data. Data analysis for item 13 demonstrated statistically significant differences between questionnaire delivery mode and frequency of checking their College provided e-mail account. Approximately, 30% indicated they routinely check their College e-mail account (daily or often), while 70 % indicated they never or rarely check their College e-mail account. For mailed surveys, respondents identified three main factors as to why they

did not respond to the questionnaire: (a) time, (b) lost the questionnaire, and (c) forgot to complete and return. Participants reported that the topic of the survey had little or no impact on why they did not respond to the questionnaire.

### *Conclusions*

Conclusions for this study are truly limited to the population under study. Therefore, the following conclusions were taken from the findings of this study:

1. Data analysis did not support comparable response rates between mailed and Internet surveys.
2. There was no evidence to suggest coverage error, within the survey population frame, was a problem.
3. Comparisons of response rates and times between the first phase and follow-up phase of the questionnaire delivery resulted in mixed findings with previous studies.
4. The time to complete and return an Internet questionnaire was found to be significantly faster than mailed questionnaires.

5. Statistically significant differences were found comparing response rates to demographic data.
6. Low respondent burden was found for the mail delivery mode, while the Internet delivery mode experienced high respondent burden.
7. Data analysis revealed the content of the questionnaire had minor to no impact on the willingness of the participant to complete and return the questionnaire.

#### *Recommendations*

The following are recommendations based on the findings of this study:

1. Use a mixed mode strategy to solicit respondents. It may be helpful to send a mailed pre-notice letter to those who will be receiving the questionnaire electronically. Additionally, sending a mailed cover-letter after the pre-notice may increase response rates. Past research indicates the need to differentiate the pre-notice e-mail from everyday spam. With the mindset of some, who feel they have been "over surveyed", it is easy to dismiss an e-mail solicitation as unwanted junk e-mail. Accordingly,

offering the opportunity to take a mailed questionnaire electronically may increase a respondent's willingness to complete and return the questionnaire.

2. Explore the effects of campus computer usage on the student population. It is logical that when one joins a member of a community they will conform to the social practices of that community. In many ways, this population seemed to ignore basic functions of this community (e.g. checking the College provided e-mail account). To uncover the meaning of this behavior, further research is needed to understand the perceived implications of computer usage among all students. Within the adult student population, basic training may need to be provided to develop increased computer skills.
3. Explore the effects of the printed (hard copy) questionnaire versus the electronic copy questionnaire. With the hard copy questionnaire, respondents can take the survey when and wherever they wish and they have a documented reminder to complete the questionnaire. With the electronic survey,

respondents are "tied" to the computer where the Internet access is located.

4. Follow-up research is needed to look at the survey time frame. The time frame for this study was compressed into 33 days. Past research supports a compressed time frame for Internet surveys (Schaefer & Dillman, 1998), however it limits response rates for mailed surveys (and could limit responses for e-mail if respondents do not check their e-mail account regularly). A longer time frame would give more opportunity for multiple contacts over a more systematic design, a concept supported in the literature (Dillman, 2000).
5. Explore the factors of nonresponse in this study with similar populations at other colleges and universities. It would be advantageous to replicate the design within other populations to determine if similar factors exist. This information could lead to improved Internet survey methodologies.
6. Offer incentives to complete and return the survey. For most colleges and universities, money is not an option. Be creative and develop other ways to develop trust and attract potential respondents to complete

the questionnaire, especially within the Internet mode. This could be a free meal at the campus cafeteria or a free five-folder notebook or a pencil/pen from the campus bookstore. Whatever is decided, more research is needed to look at the effects of non-monetary rewards within a campus population.

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**APPENDICES**

**APPENDIX A**

January 20, 2006

«firstname» «lastname»  
«permadd1»  
«permadd2»  
«permcity», «permstate» «permzip»

Within the next few days, you will receive in the «type» a request to complete a brief questionnaire for an important research project being conducted by Craig T. Layman, a University of Tennessee doctoral student. The topic of the research project is *Technology Usage and Fees and Tusculum College*.

I am writing in advance to notify you of this very important project. Research in the past indicates many people like to know ahead of time that they will be contacted. This research is important to the students using the campus technologies and to Tusculum College. Your involvement is voluntary and you may stop participation at any time. All responses are confidential.

Thank you in advance for your willingness to complete the questionnaire. It is because of your willingness to help that improvements can be made.

Sincerely,



Craig T. Layman  
Doctoral candidate  
University of Tennessee

**APPENDIX B**

«firstname» «lastname»  
«permadd1»  
«permadd2»  
«permcity», «permstate» «permzip»

Hello! I am writing to ask your participation in a study of campus technologies. This study will help determine the types of technologies needed for successful completion of course work taken at Tusculum College.

I am contacting a random sample of Tusculum College students from each campus in East Tennessee to ask opinions on technology usage and fees. Results from this study will help improve campus computing opportunities. By understanding the needs of the students, College officials can better determine the resources needed to complete course work taken at Tusculum College.

Your answers are completely confidential and will only be viewed individually by the researchers conducting the survey. Summaries of the results will be released, but no individual answers will be identified. When you return your completed questionnaire, your name will be removed from the checklist and your answers will be summarized.

Your involvement in this survey is completely voluntary. However, your help is greatly appreciated. By taking a few minutes to share your opinions, you can make a difference.

If you have any questions concerning this study, please feel free to contact me. You can reach me toll-free at 1-800-729-0256 or 1-865-693-1177. Or, feel free to e-mail me at [clayman@utk.edu](mailto:clayman@utk.edu) or [clayman@tusculum.edu](mailto:clayman@tusculum.edu).

Thank you once again for helping us with this important study.

Sincerely,



Craig T. Layman  
Doctoral candidate  
University of Tennessee, Knoxville

**APPENDIX C**

## Technology Usage and Fees at Tusculum College

### Demographics

The purpose of this survey is to identify ways to improve campus computing technologies. It will only take about 10 minutes to complete.

Mark your answer in the box with a pen or pencil.

**1. Please indicate your current enrollment level?**

- Freshman (0-30 Credit hours earned)
- Sophomore (31-60 Credit hours earned)
- Junior (61-90 Credit hours earned)
- Senior (91-Above Credit hours earned)
- Graduate
- Special Student/Certificate/Non-degree seeking
- Do not know

**2. Please indicate your current major:** \_\_\_\_\_

**3. Age:**

- 18-25
- 26-35
- 36-45
- 46-55
- 56 or older

**4. Gender:**

- Male
- Female

**5. How do you identify yourself?**

- (1) Native American
- (2) Asian/Pacific Islander
- (3) Caucasian/White
- (4) African American/Black
- (5) Hispanic/Latino
- (6) Arab American
- (7) Other, please specify \_\_\_\_\_

## Technology Usage

Mark your answer in the box with a pen or pencil.

6. I have access to a computer AT HOME?

- Yes  
 No

7. I have access to a computer AT WORK?

- Yes  
 No

8. I have access to a computer AT TUSCULUM COLLEGE?

- Yes  
 No

9. To what extent do you use computer applications in these areas for your class assignments at TUSCULUM COLLEGE?

	Great Extent All	Some Extent	Small Extent	Not at
(a) Word Processing.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Internet.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Presentations/Speeches.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) Data Analysis.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Multimedia.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Graphics.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) E-mail.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h) Other _____				

**10. To what extent do you use the following technological resources for your class assignments?**

	Great Extent	Some Extent	Small Extent	Not at All
	▼	▼	▼	▼
(a) Computers.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Video Camera.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) VCR.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) DVD.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Printer.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Scanner.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) LCD Projector.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h) Copy Machine.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(i) CD Burner.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(j) Digital Camera.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(k) Other_____				

**11. It is important to have access to campus technologies to complete my Tusculum College course work.**

- Strongly Agree
- Agree
- Neither Agree or Disagree
- Disagree
- Strongly Disagree

**12. I use computer labs at Tusculum College for my course work?**

- Rarely (1-2 Times a Semester)
- Sometimes (3-4 Times a Month)
- Often (3-4 Times a week)
- Daily ( at least once a day)
- Never

**13. I check my Tusculum College e-mail account?**

- Rarely (1-2 Times a Semester)
- Sometimes (3-4 Times a Month)
- Often (3-4 Times a week)
- Daily ( at least once a day)
- Never

**Student Fees**

Mark your answer in the box with a pen or pencil.

**14. There are many opinions concerning student fees. Please indicate your position in the following items:**

a) Student fees are **important** to Tusculum College programs.

- Strongly Agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly *disagree*

b) Student fees are a good way to **maintain** computer labs and computer services at Tusculum College.

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

c) Student fees are a good way to **enhance** computer labs and computer services at Tusculum College.

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

**APPENDIX D**

## Technology Usage and Fees at Tusculum College

---

The purpose of this survey is to identify ways to improve campus computing technologies. It will only take about 10 minutes to complete. This section covers demographic questions. There are 5 questions on this page. Do not forget to scroll down.

---

1 Please indicate your current enrollment level?

- Freshman (0-30 Credit hours earned)
  - Sophomore (31-60 Credit hours earned)
  - Junior (61-90 Credit hours earned)
  - Senior (91-Above Credit hours earned)
  - Graduate
  - Special Student/Certificate?Non-degree seeking
  - Do not know
- 

2 Please indicate your current major:

---

3 Age:

- 18-25
- 26-35
- 36-45
- 46-55
- 56 or older

---

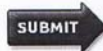
4 Gender:

- Male
- Female

---

5 How do you identify yourself?

- (1) Native American
- (2) Asian/Pacific Islander
- (3) Caucasian/White
- (4) African American/Black
- (5) Hispanic/Latino
- (6) Arab American
- Other, Please Specify



Survey Page 1

---

### Technology Usage and Fees at Tusculum College

---

This section asks 8 questions covering technology usage.

---

6 I have access to a computer AT HOME?

- YES  NO

---

7 I have access to a computer AT WORK?

YES  NO

---

8 I have access to a computer AT TUSCULUM COLLEGE?

YES  NO

---

9 To what extent do you use computer applications in these areas for your class assignments at TUSCULUM COLLEGE?

1 Great Extent	2 Some Extent	3 Small Extent	4 Not at All
-------------------	------------------	-------------------	-----------------

(a) Word Processing

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(b) Internet

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(c) Presentations/Speeches

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(d) Data Analysis

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(e) Multimedia

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(f) Graphics

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

(g) E-mail

<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
-------------------------	-------------------------	-------------------------	-------------------------

---

10 To what extent do you use the following technological resources for your class assignments?

1	2	3	4
---	---	---	---

	Great Extent	Some Extent	Small Extent	Not at All
(a) Computers	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(b) Video Camera	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(c) VCR	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(d) DVD	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(e) Printer	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(f) Scanner	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(g) LCD Projector	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(h) Copy Machine	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(i) CD Burner	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
(j) Digital Camera	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4

11

It is important to have access to CAMPUS technologies to complete my TUSCULUM COLLEGE course work?

- Strongly Agree
- Agree
- Neither Agree or Disagree

- Disagree
- Strongly Disagree

---

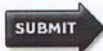
12 I use computer labs at TUSCULUM COLLEGE for my course work?

- Rarely (1-2 Times a Semester)
- Sometimes (3-4 Times a Month)
- Often (3-4 Times a Week)
- Daily (At least once a day)
- Never

---

13 I check my TUSCULUM COLLEGE e-mail account?

- Rarely (1-2 Times a Semester)
- Sometimes (3-4 Times a Month)
- Often (3-4 Times a Week)
- Daily (At least once a day)
- Never



Survey Page 2

---

### Technology Usage and Fees at Tusculum College

---

There are many opinions concerning student fees. Please indicate your position in the following items:

---

14 Student fees are important to Tusculum College programs.

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

---

15 Student fees are a good way to maintain computer labs and computer services at Tusculum College.

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

---

16 Student fees are a good way to enhance computer labs and computer services at Tusculum College.

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

**APPENDIX E**

September 5, 2005

«firstname» «lastname»  
«permadd1»  
«permadd2»  
«permcity», «permstate» «permzip»

Two weeks ago a questionnaire was sent to you asking your opinions concerning Technology Fees and Usage at Tusculum College. Your name was drawn randomly from the student population at Tusculum College.

If you have already completed and returned the questionnaire, please accept my sincere thanks. If not, please do so today. Your help is greatly appreciated.

If you have misplaced the questionnaire, or if you did not receive your copy, please contact me at [clayman@utk.edu](mailto:clayman@utk.edu), or 1-800-729-0256.

Thanks,

A handwritten signature in black ink, appearing to read "Craig T. Layman", with a long horizontal flourish extending to the right.

Craig T. Layman  
Doctoral candidate  
University of Tennessee, Knoxville

**APPENDIX F**

**Technology Usage and Fees Survey**  
**Telephone Follow-up to Nonresponse of the questionnaire**

Opening Statement:

Hello! I am a doctoral student at the University of Tennessee. A few weeks ago, a questionnaire was sent to you by mail/e-mail titled Technology Usage and Fees at Tusculum College. The topics covered multiple aspects of technology usage, including a section titled student fees. This questionnaire was designed to help improve campus computing opportunities. According to my records, you did not respond to the survey. I would like to ask you a few question to try and determine why you did not return the survey. This will take about 3 minutes.

Name of Participant: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Call Number	Date	Time	Comments

**APPENDIX G**

Questions Participants May Ask During the Telephone Interviews.

1. Why did you select me?
2. Why did I receive the survey by mail/email?
3. How can I remain anonymous if you are calling me?
4. How many people are participating in this survey?
5. Do my opinions really matter?
6. Can you assure me I will not be identified?
7. Will I be able to view the results?
8. Are there any incentives for participating?
9. Who will use this information?
10. Who is the sponsor of this survey?
11. What decisions will be made with this information?
12. What kind of improvements will be made?
13. When will we see the improvements?
14. Are you increasing student fees?
15. Why do you charge student fees?
16. When will the campus go wireless?

**APPENDIX H**

## Questions

Q1: Do you remember receiving the survey?

If yes, did you open the survey? If yes, skip to question 2.

If no, respond, "the survey was sent by mail/email."

If no again, thank you for your time. Record no memory of survey as the reason they did not respond.

Q2: Did the survey topic interest you?

If yes, ask why?

If no, skip to question 3.

Q3: Why did you not complete and return the survey?

Q4: What is your preference when taking a survey—mailed or Internet?

Closing Statement:

Thank you for your time, you have been very helpful in helping us determine how to contact Tusculum students. Do you have any questions?

**APPENDIX I**

		Survey Delivery Mode			
		Mail	Internet	Total	
I check my Tusculum College email account?	Rarely (1-2 Times a Semester)	Count	21	1	22
		% within I check my Tusculum College email account?	95.5	4.5	100.0
		% within Survey Delivery Mode	24.4	5.0	20.8
		% of Total	19.8	.9	20.8
		Std. Residual	.7	-1.5	
	Sometimes (3-4 Times a Month)	Count	17	5	22
		% within I check my Tusculum College email account?	77.3	22.7	100.0
		% within Survey Delivery Mode	19.8	25.0	20.8
		% of Total	16.0	4.7	20.8
		Std. Residual	-.2	.4	
	Often (3-4 Times a Week)	Count	18	4	22
		% within I check my Tusculum College email account?	81.8	18.2	100.0
		% within Survey Delivery Mode	20.9	20.0	20.8
		% of Total	17.0	3.8	20.8
		Std. Residual	.0	-.1	
Daily (at least once a day)	Count	4	6	10	
	% within I check my Tusculum College email account?	40.0	60.0	100.0	
	% within Survey Delivery Mode	4.7	30.0	9.4	
	% of Total	3.8	5.7	9.4	
	Std. Residual	-1.4	3.0		
Never	Count	26	4	30	
	% within I check my Tusculum College email account?	86.7	13.3	100.0	
	% within Survey Delivery Mode	30.2	20.0	28.3	
	% of Total	24.5	3.8	28.3	
	Std. Residual	.3	-.7		
Total	Count	86	20	106	
	% within I check my Tusculum College email account?	81.1	18.9	100.0	
	% within Survey Delivery Mode	100.0	100.0	100.0	
	% of Total	81.1	18.9	100.0	

## VITA

Craig Timothy Layman received a Bachelor of Business Administration with a concentration in Accounting from East Tennessee State University in 1999 and a Master of Arts in Management from Tusculum College in 2001. He has experience in fiscal and budgetary management, department and program development, leadership, and project management. He received a Doctor of Education with an emphasis in Educational Research from the University of Tennessee in August 2006.

He currently serves as the director of academic advising and student services for Tusculum College. In addition, he serves as an adjunct instructor teaching undergraduate research and first year studies.