

THE EFFECTS OF DATA COLLECTION METHOD AND MONETARY INCENTIVE ON RESPONSE RATES AND DATA INTEGRITY IN STUDIES OF PROSPECTIVE COLLEGE STUDENTS

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ABSTRACT

The present study investigated the effects of monetary incentive and data collection method on response rates and data integrity among college inquirers. Incentives profoundly affected response rates, but not data quality. Survey methodology, while minimally impacting sample demographics, affected both the educational priorities endorsed and evaluations of the target institution.

INTRODUCTION

Background

The on-line population certainly is not identical to the United States population, as not everyone has a computer and not every computer is connected to the Internet. However, the “digital divide” is narrowing. As of fall 2000, nearly half of all U.S. households were on-line. Furthermore, this number is expected to increase to nearly 60% by 2003 (Dzwierzynski, 2000). Traditionally, practitioners of consumer research have held that the use of the Internet to collect data will often lead to under-sampling some populations while over-sampling others. However, every method of data collection has its potential biases as well as practical advantages and disadvantages. As *Table I* shows, on-line surveys share some strengths of mail and phone surveys while offering unique opportunities and challenges.

Table 1: Advantages and Disadvantages of Internet-based, Mail and Phone Data Collection Methods		
Method	Advantages	Disadvantages
Internet-based (or On-line) Survey	Larger sample sizes are more manageable, less costly to collect and process, and facilitate more sophisticated analyses Shorter turnaround time 24-hour access to respondents Use of complex skip patterns and inclusion of dynamic content Ability to incorporate visual stimuli Not subject to interviewer bias Respondents work at their own pace Collect more in-depth verbatim responses Environmentally friendly (no paper waste)	Not necessarily the lowest in cost (for simple questionnaires with few questions, the Internet is often a more expensive method) Sampling limitations (many institutions do not collect e-mail addresses of constituencies relevant to the research) Prone to response and sampling bias: (1) respondents need to be familiar with the Web and must have access to the Web and (2) only those with enough interest or incentive will complete the survey Potential for multiple or fraudulent responses (especially if an incentive is offered) Lose ability to probe and clarify on open-ended responses or explain ambiguous questions Security concerns Can be more time intensive to manage Often need to offer incentive to boost participation Longer lead time with programming of survey Very little control in securing response from specific individual
Mail Survey	Generally least expensive way to collect data Can incorporate visual stimuli Not subject to interviewer bias Respondents work at their own pace	Sequence bias as respondents can see the entire questionnaire as they respond Limited ability to customize and include skip patterns in survey Not environmentally friendly (paper waste) Lose ability to probe and clarify on open-ended responses or explain ambiguous questions Handwriting problems Longer turnaround time Very little control in securing response from specific individual
Phone Survey	Can customize and use complex skip patterns Response rates are often higher Sequence of questions easily changed	Increasing respondent non-compliance Cannot include dynamic content or visual stimuli Often the most expensive method Difficult to establish representative sampling frame due to unlisted numbers Long interview difficult to keep respondent on the phone Subject to some degree of interview bias Can be difficult to determine that the appropriate person has been interviewed

Fortunately, researchers who hope to use the Internet to administer surveys to prospective and current college students have fewer obstacles to overcome in their use of this technology for collecting data than do business and consumer researchers. Most high school and college students are regular and adept users of the Internet, and many colleges and universities now give their students a personal e-mail account upon registration. Moreover, the on-line population tends to be college educated with 40% having attained a college degree, 36% having attended some college, and 25% being high school graduates (Dzwierzynski, 2000).

Still, while many of the target populations in higher education research are accessible via the Web, it is not clear whether data collected via an on-line survey can be benchmarked against data collected via other methods. Some research has been done investigating response rates and data integrity in consumer and business research, and this research reveals that the method of collection can affect response rates and even the data itself.

Method and Response Rate. Mehta and Sivadas (1996) and Schuldt and Totten (1994) found no significant differences in response rates between electronic and postal mail surveys; however, Tse et al. (1995) found that mail surveys resulted in higher response rates than e-mail surveys. Likewise, Weible and Wallace (1998) found that conventional mail garnered slightly higher response rates than did e-mail and Web surveys. In sum, while results are mixed, research indicates that there may be interactions between method of data collection and response rate with e-mail and on-line surveys resulting in lower response rates than other, more traditional methods.

Method and Data Quality. Consumer research indicates that the representativeness of the sample, depth and completeness of responses, and honesty of respondents may vary by method, particularly when comparing self-administered surveys (mail and on-line) to other modes of administration (phone and in person). Peterson (2000) reported that consumers' "intent to buy" ratings vary by data collection medium (in-person, mail, or Internet). He also noted that consumers tend to be more honest and give more in-depth responses when completing a survey on-line and that Internet and mail methods yielded samples of similar demographic representation. Dzwierzynski (2000) noted that one of the benefits of on-line surveys is that respondents do not give the "politically correct" answer and therefore supply richer verbatim responses. In sum, research indicates that Web surveys may be similar to mail surveys in terms of the representativeness of the resulting samples; however, there are differences between self-administered and other methods of data collection in terms of the resulting data. While these differences are noted in consumer research, it is not clear if these differences also exist in research conducted among constituencies important to research focusing on higher education

Incentive and Response Rate. Frequently, efforts to increase response rates include offering some type of monetary incentive. Several studies have been conducted examining the effect of such enticements on response rates. Shaw et al. (2001) reported a significantly higher response rate among those offered a \$5 compared to a \$2 incentive in a digestive health status mail survey. While in a meta-analysis of 38 studies, Church (1993) found that the inclusion of a monetary incentive increased response rates in mail surveys. In another meta-analysis, Yammarino et al. (1991) similarly concluded that monetary incentives were effective in increasing survey response rates in mail surveys. In other research, Yu and Cooper (1983) found that: (1) persons receiving a monetary incentive responded at a higher rate than those not offered an incentive and (2) the amount of incentive had a positive linear relation to response rates in personal interviews, telephone interviews, and mail surveys.

The cost of conducting research, obviously, is greatly affected by the relationship between response rate and incentive. In his review, Lee (1987) suggests that although offers of incentive do increase response rate, the corresponding increase in project costs may be unacceptable. Shaw et al. (2001) found that while a \$5 incentive boosted response rates over a \$2 incentive among a group of health plan enrollees (74% to 67% respectively), the cost of each survey in the \$2 condition was 41% less expensive. Weible and Wallace (1998) found that while survey response rates for e-mail and Web-based versions are lower than traditional mail surveys, the

cost of administering the mail surveys was substantially higher. In sum, it is conceivable that the use of monetary incentives to boost response rates in an e-mail or Web-based data collection method may translate to project cost savings if respondents are invited to participate by electronic means (i.e., e-mail, banners on Website).

Incentive and Data Quality. Several studies have been conducted examining the effect of monetary enticements on the quality and completeness of data. Shaw et al. (2001) assessed the effect of incentive size on data quality and found no difference among groups as measured by item non-response rate and scale scores. However, their survey was composed solely of closed-ended items. In contrast, Goetz et al. (1984) employed an instrument that included both open- and closed-ended items. They found that the use of an incentive was associated with greater completeness in both the open- and closed-ended responses. They also found no incentive effect (unpaid versus paid) on the representativeness of the sample.

The applicability of these findings for higher education research needs to be examined more closely. As a researcher's primary goal should be to translate the information that is collected and analyzed into new knowledge and solutions, the effect that survey methodology has on response rates and the validity of data collected is critical in interpreting research results. With such issues in mind, the authors undertook research to extend the existing consumer and business research findings to the higher education arena by investigating the effect that survey methodology and incentives have on response rates, and data integrity among prospective college students.

Research questions

The present study will focus on the following questions:

- ***Effect of Method***
 - While the findings of other research are mixed, some consumer research indicates that on-line surveys achieve lower response rates than mail. In a survey of prospective students, will different data collection methods result in dissimilar response rates?
 - Consumer research indicates that data quality and sample representativeness may vary by method of collection. In a survey of prospective students, will some ratings tend to be lower on average when collected via the Internet as compared to the other methods? Do respondents offer more in-depth, honest responses when completing the survey on-line or by mail survey? Will the three samples be comparable in terms of their representativeness?

- ***Effect of Incentive***
 - Consumer research indicates that a monetary incentive increases response rates. Will we find that response rates differ by the amount of incentive offered?
 - Consumer research indicates that incentive has little or no effect on data quality and representativeness of the sample. Will data collected among prospective students be comparable across differing incentives?

METHOD

The sample was provided by a private four-year college in New England, and includes prospective students who were seniors in high school at the time of data collection. The target school provided two lists of student inquirers. One list was comprised of students who had informed the school of their ethnic minority status. The second list consisted of student inquirers who had either given the target school no ethnic information or had stated that they were White/Caucasian. In order to ensure that the research was conducted with a sufficient number of students who represented all ethnic groups in the inquiry pool, a stratified random sample technique was used to develop the list of those who would be invited to participate in the study.

A survey instrument was designed to measure the college selection priorities, opinions, and perceptions of a sample of prospective students. The current research focuses on the following data:

- the importance to prospective students of 36 college/university characteristics;
- the assessed quality of the target school with respect to these characteristics;
- open-ended questions about respondents' application schools; and
- demographics (gender, ethnicity, class rank, SAT and ACT scores, family income, state of residence).

In order to elicit more candid responses, the target institution was not identified as the client at any time during the data gathering process. Only data for those students who completed the survey were included. The survey employed in the present research was designed so that it could be administered in any of three modalities: by mail, via the Internet, and as a telephone interview.

Phone. Letters introducing the phone survey were sent out during the week of December 11, 2000. These letters were sent to a random sample of 3,000 students (White/Caucasian or no ethnicity reported) and a random sample of 1,000 self-reported ethnic minority students. A follow-up mailing to 500 additional White/Caucasian students was sent the week of January 15 to add to the existing phone interview pool. Potential phone participants were not offered any financial incentive to participate.

Mail. During the week of December 29, mail surveys were sent to 2000 inquirers using the same sampling method. These surveys were mailed to 1,600 White/Caucasian students and 400 minority students.

On-line. The invitation to participate in the on-line research was sent during the week of January 15, 2001, to 1,600 White/Caucasian students and the remaining pool of minority students (387) using the same sampling method.

Inquirers invited to participate in the mail and on-line surveys were offered incentives of \$0, \$5, or \$10 to participate. The process of offering incentives was randomized, with a third of each sample receiving each incentive level.

RESULTS

Effect of incentive on response rate

Analysis reveals that incentive had a profound effect on response rates in the on-line and mail samples. As **Table 2** illustrates, response rates nearly tripled for both mail and on-line samples when some incentive (\$5) was offered. Increasing the incentive to \$10 had a more profound effect for mail respondents (increasing from 15% to 29%) than for on-line participants (from 15% to 22%). Phone surveys garnered the highest response rates among those not offered an incentive, most likely due to the dynamic nature of the method with repeated attempts being made to reach each potential participant.

TABLE 2			
Response Rates by Data Collection Method and Incentive			
Method	Mailing	Completed Surveys	Completion Rate
Phone (no incentive)	4,500	477	10.6%
Mail			
\$ 0	666	34	5.1%
\$ 5	667	102	15.3%
\$10	666	191	28.7%
On-line			
\$ 0	662	35	5.3%
\$ 5	663	99	14.9%
\$10	662	143	21.6%

The relationship of incentive, response rate, and project cost

Table 3 provides projections of approximate project costs given the response rates outlined in Table 2, and assuming a target sample size of 1,000 with a fairly lengthy survey (eight pages). As Table 3 reveals, the phone survey with no monetary incentive method is by far the most costly, while the \$5 incentive/mail survey is the least expensive of the methods. Note that the cost of doing an on-line survey drops dramatically if e-mail addresses are available for notification, particularly without use of a monetary incentive. As this condition was not part of this study, response rates are assumed equal to the on-line/pre-mailing method used, though as will be discussed later, it appears response rates could actually be higher utilizing e-mail notification for many higher education populations.

Table 3				
Cost to Obtain 1,000 Completed Surveys For 8-Page Instrument				
Amount of Incentive	Phone	Mail	On-line	
			Mail Notification	E-mail Notification
No Incentive				
Size of Initial Mailing	8,000	20,000	20,000	20,000
Mailing Cost*	\$4,160	\$17,700	\$10,400	\$0
Data Capture**	\$30,000	\$3,000	\$10,000	\$10,000
Total Cost	\$34,160	\$20,700	\$20,400	\$10,000
\$5 Incentive				
Size of Initial Mailing	-----	6700	6700	6700
Mailing Cost*	-----	\$6,400	\$3,480	\$0
Data Capture**	-----	\$3,000	\$10,000	\$10,000
Incentive Payments	-----	\$5,000	\$5,000	\$5,000
Check processing***	-----	\$800	\$800	\$800
Total Cost	-----	\$15,200	\$19,280	\$15,800
\$10 Incentive				
Size of Initial Mailing	-----	3700	5000	5000
Mailing Cost*	-----	\$3,850	\$2,600	\$0
Data Capture**	-----	\$3,000	\$10,000	\$10,000
Incentive Payments	-----	\$10,000	\$10,000	\$10,000
Check processing***	-----	\$800	\$800	\$800
Total Cost	-----	\$17,650	\$23,400	\$20,800

*Assumptions:

Mail: Mailing Costs of .85 per mail survey and .70 per return on 8-page survey.

On-Line and Phone: Mailing Costs of .52 per notification.

**Specifications for Data Capture:

Phone: Cost of utilizing phone bank.

Mail: Cost of data entry service.

On-line: Cost of programming and hosting survey.

***Check Processing: Assumes cost of .80 per incentive payment.

Effect of incentive on data integrity

Analysis of Variance was utilized to examine the effects on continuous variables by incentive and method of data collection for on-line and paper participants. No significant interactions

between method and incentive were found, nor were main effects of incentive level. Categorical variables were examined using Chi-square analysis, and no significant effects were found for incentive on any major demographic or attitudinal variables for either on-line or paper participants. Failure to find significant effects of incentive level allowed us to examine the main effects of collection method.

Effect of collection method on data integrity

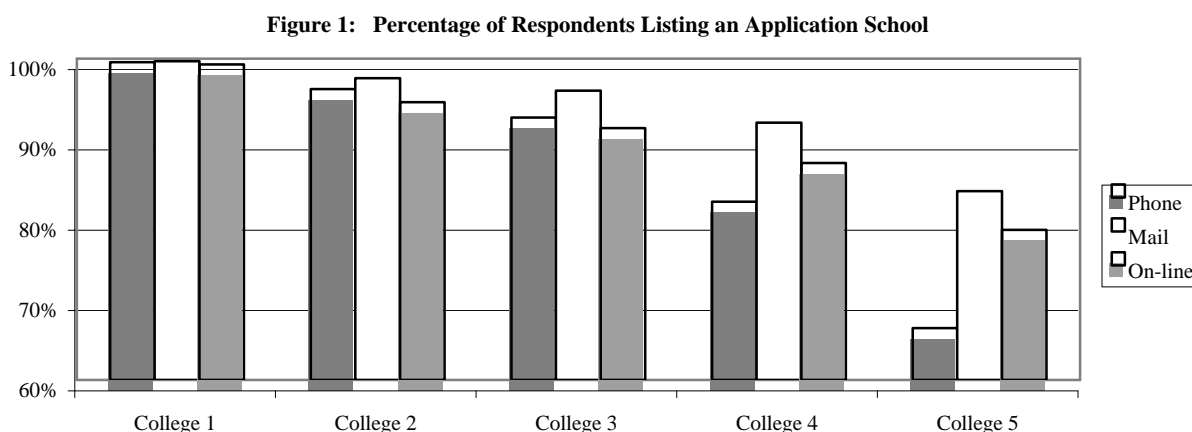
Demographic Profile. Contrary to the general belief regarding the accessibility of the Internet among different socioeconomic groups, the three samples were found to be fairly comparable in terms of their demographic composition, with the only statistically significant differences being found for income level and gender. Of the respondents reporting their family income, a slightly higher percentage of phone participants (50%) reported incomes over \$100,000 than mail (40%) or on-line (41%) participants. Females, in general, participated at a higher rate than males, with mail having the highest proportion of women in the sample (71%), followed by phone (65%) and on-line (61%). Although Chi-square analyses did not reveal a significant difference in the ethnic distribution of the three samples, Black/African-American students tended to respond at slightly higher rates by phone (9%), than to mail (8%) or on-line (6%). There was also approximately the same percentage of New England residents in each sample (37% phone, 39% mail, and 36% on-line). SAT Verbal, SAT Math and ACT scores were virtually identical among the three samples, as was the distribution for class rank. The proportion of those intending to major in one of the four primary categories (business, social sciences, humanities, and science and technology) was also quite similar among groups, with on-line participants exhibiting only marginally higher numbers of science and technology and business majors in comparison with the other two groups.

Student Priorities. An area of substantial divergence among groups was in the ratings of the importance of college characteristics in the college selection process. The survey respondents were asked to rate each of the 36 characteristics on a 5-point scale where 1 = “not at all important” and 5 = “very important.” The list of characteristics included items that measured social, academic, and financial features of an institution. Phone and mail participants were found to place greater emphasis on community service opportunities, liberal arts education, career counseling, quality of classrooms, labs, studios, and study abroad opportunities than did Internet respondents. Further, phone participants were more interested than on-line participants in the presence of fraternities, racial/ethnic diversity of the student population, and campus cultural life (music, dance, theatre). Interestingly, there were no significant differences by method with regard to characteristics related to academic quality, financial issues, and location. These differences seem to indicate that the composition of on-line participants may be slightly skewed toward individuals who share many of the same priorities as others, but place less emphasis on social variables.

Quality Ratings of Target Institution. The prospective students were asked to rate the target institution for quality on each of the 36 characteristics using a 5-point scale where 1 = “very low

quality” and 5 = “very high quality.” Of the 36 characteristics, 20 received significantly higher ratings from the phone participants than from at least one of the other two groups. There were no significant differences in quality ratings between mail and on-line participants. This data suggests that there may be a demand characteristic at play in phone methodology that elevates quality ratings when compared to methods with less personal contact. Alternately, individuals agreeing to a phone interview may be predisposed to more positive ratings in general than those opting for an on-line or mail survey.

Frequency and Quality of Open-End Responses. Participants were asked several open-end questions, some inviting multiple responses. For example, participants were asked the following question: “*To which colleges or universities are you thinking of applying? Please give me your top five most likely choices -- with the state location for each school.*” As can be seen in **Figure 1**, the percentage of participants giving one, two or three colleges is approximately equivalent among different methods of data collection. However, the phone sample showed fewer participants who gave a fourth response when compared with mail, and a substantially lower percentage of phone participants gave a fifth response compared to both mail and on-line.



DISCUSSION AND IMPLICATIONS

Although it is generally recognized that data generated from market research can be of tremendous importance when making critical policy decisions, great care must be taken to ensure that the information is valid. One of the primary considerations, the method of data collection, should therefore be considered carefully. The current study produced four main findings.

Finding 1

The provision of incentive greatly affects response rates but not the demographics of the sample or manner of responding.

As expected from previous research (Church, 1993; Yu and Cooper, 1983), the presence of a monetary incentive greatly enhanced response rates. In our research, response rates triple from the no incentive to \$5 incentive conditions for mail and on-line methods. Interestingly, for on-line participants the increase of incentive from \$5 to \$10 only yielded a 7 point increase in response rate (from 15% to 22%) while the effect was much more dramatic in the mail condition with an increase from 15% to 29%. Whether this differential increase is an anomaly of this particular study or a true effect of mail versus Web-based methodology requires more research.

However, it is apparent from this study that there is a core group of individuals who will participate in research regardless of the offering of an incentive. When repeated attempts are made to reach students to complete a survey via phone (or perhaps follow-up mailings/e-mails to non-participants of mail and on-line methods) response rates are elevated. The provision of any incentive, as Shaw et al. (2001) surmised, has symbolic value that also boosts participation. This study partially supports Yu and Cooper (1983) in that an increase in incentive elevates response rates. Whether this effect is equivalent across modalities is what remains in question. It is possible that some individuals are wary of "Internet scams" or the security of their personal information on the Web, and no matter how high the incentive, may not participate in on-line research. Thus, the participation ceiling for methods may be different, thus limiting the effectiveness of unlimited incentive.

Survey response rates are highly variable depending on a number of factors including the timing of the data collection. In a separate study of inquirers of a large public university, data collected in March quickly surpassed the target; in June, however, the responses were considerably slower.

The most encouraging finding of the present study is that the demographic profiles are not significantly skewed by the provision of an incentive. There is also no evidence that the presence of incentive changes response style in any manner. The examination of the data quality indicates that once committed to participating in the research, respondents approach the task honestly and thoughtfully.

Practical issues do abound with the introduction of incentive. In particular, when offering monetary incentives, it is important that there be a means of checking that participants do not complete the survey several times in order to receive extra incentive payments or recruit outside individuals who are not the target of the research.

Finding II

Variable response rates resulting from the interaction between the amount of incentive offered and mode of data collection greatly affect the cost of conducting research.

The summary information provided in Table 3 underscores the profound impact that decisions about mode of collection and incentive can have on the cost of a research study. Many may examine the raw cost and time-consuming nature of incentive payments and initially balk, but closer examination reveals that, at least utilizing the response rates in this study, the provision of a \$5 incentive actually lowers overall costs for paper and on-line surveys.

While the \$10 incentive further boosts completion rates, particularly in the mail condition, project costs increase substantially from the \$5 condition. Shaw et al. (2001) found that higher incentives do not have linear effect on increasing response rates and have diminishing returns in terms of project costs. Further, on-line research may be a poor value when sample sizes are small given programming and hosting costs.

Sweepstakes, as opposed to individual payments, offer potential cost savings and procedural simplicity. Maguire Associates has utilized sweepstakes (as opposed to individual) payment for current college students and adult populations with some success. The primary advantage of this method is that total cost for incentives is held constant and is not dependent on overall sample size or response rate. Further, as Table 3 shows, there can be significant expense in processing and mailing individual payments. Both individual payment and sweepstakes methods, paired with active encouragement by campus administrators, seem to have great promise in producing high response rates. However, the legal implications of sweepstakes drawings need to be addressed and may be inappropriate or unwise with younger audiences.

Target populations may also vary greatly in response to mode of collection and incentive. For example, data were also collected from the alumni of the target school of the current paper. Ten thousand alumni were offered the opportunity (without monetary incentive) to complete a survey on-line or via a mail survey which was enclosed in the mailing. Surprisingly, the vast majority of completed surveys were supplied by mail (2,061 vs. 137). Similarly, in a paper/on-line survey of parents of current students at a four-year private institution, respondents were found to be relatively inclined to respond by mail rather than on-line. There are several possible explanations for these results. Alumni and parent populations might be less likely to be on-line and as a result, more likely to prefer a mail survey. Alternately, it might be that once a respondent has a paper survey in hand, he or she is more likely to complete it than to turn on a computer, access the Web, and type in a URL in order to access and complete a survey.

Graduate students and general adult populations have proved to be more challenging populations from which to obtain data via the Internet even when incentives are offered. However, our experience is that these difficulties are inherent in all methods of data collection with adults. For on-line data collection, it may be necessary to increase original sample sizes and conducting e-mail or traditional mail follow-ups to facilitate greater response.

Finding III

The method of acquisition has marginal impact on the demographic profile, but on-line participants may have different priorities than others.

As noted in the results, the students who took the present survey on-line may be attitudinally, and perhaps behaviorally, different from their peers in the social interaction and personal growth arenas. Those who took the survey on-line, compared to those who completed the survey by phone or mail, tended to place less importance on the characteristics of community service, presence of fraternities and sororities, campus safety & security, liberal arts education, career counseling services, study abroad opportunities, racial/ethnic diversity, and campus cultural life. At first-glance, there is a tendency to believe that technology-oriented institutions would be best served by on-line surveys and liberal arts schools by paper or phone surveys. However, closer scrutiny of the results of this study suggests that technology-orientation is more of a personal or behavioral characteristic of the survey-taker than an indication of his course of study. Identifying those participants who are technology-oriented may prove quite difficult; in this study students' major or field of study is not related to the response rate by method.

An important process question, beyond the integrity of the data, is: "How will our target population view this research?" For a school serving lower-income students where many may be first-generation college students, how would that student perceive his fit to the institution, if he is unable to access an on-line survey? Each constituency's impressions should be measured accurately, but in a way that reflects the school in a positive light. The very nature of market research requires communication to and from an important stakeholder and must be treated and analyzed as a part of an overall marketing and communication strategy.

Finding IV

Personal contact (i.e., telephone interviews) may tend to elevate subjective ratings of a target institution.

Education, until the fairly recent but rapid proliferation of distance learning, CD-ROM viewbooks, and e-mail communication, has traditionally been an industry of face-to-face interaction and communication. Using the Internet to gather impressions may seem like a less exact science, because body language cannot be read or voice tone assessed, as would be the case in a focus group or telephone interview, but the presence of an interviewer or moderator may yield less honest opinions and assessments. The results of this study concur with Peterson (2000) and Dzwierzynski (2000) in that the prospective students were more apt to give lower quality ratings for the target institution if they completed the survey by mail or on-line as compared to phone respondents. In short, the present research highlights the fact that students

may be less affected by social desirability demands when offered the anonymity of responding on paper or via the Internet.

Phone interviews do allow for further probing and clarification in a manner generally more difficult via on-line or paper survey. However, quality phone interviewing requires intense training (with time and monetary costs) to insure that interviewers are knowledgeable about the responses they may receive from students yet objective and consistent in their questioning. Conversely, paper and on-line surveys must be constructed such that there is little margin for misunderstanding of items.

As always, it is important to consider the individual school, the demographics of the potential respondents, and the constituencies of interest prior to determining the method of data collection. Although there were no substantial differences in the demographics by data collection method or presence of incentive in this study, it is conceivable that respondents from another institution could exhibit significant attitudinal or demographic differences depending on the conditions of data collection.

CONCLUSION

Web-based surveying offers considerable promise for researchers assessing college and university populations. The speed and cost-efficiency of data acquisition, as well as the seamless administration of complex surveys, may provide opportunities that would not be available with phone or mail surveys. Certainly, more research needs to be conducted to examine the influence of Internet surveys on response rates, sample demographics, and data integrity among various traditional and non-traditional higher education groups; however, the current study lends an optimistic voice of support for the preservation, and in some cases enhancement, of data validity using Internet resources.

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