



**Association for
Institutional Research**

PROFESSIONAL FILES | FALL 2016 VOLUME

Supporting quality data and decisions for higher education.

Letter from the Editor

This volume presents fresh solutions to two perennial challenges for institutional researchers: dealing with declining survey response rates and finding meaning in copious amounts of text data.



In their article *An Alternative Approach: Using Panels to Survey College Students*, Sarraf, Hurtado, Houlemarde, and Wang describe an experiment to compare results from the standard NSSE administration process with one using much smaller samples and multiple short surveys. Do you believe response rates, scale reliabilities, and factor structures can hold up with panel methods? Read their research to find out if it can work for you.

If you've ever neglected open-ended survey comments simply because you didn't know what to do with all that text, Zilvinskis and Michalski provide a lifeline. Their article, *Mining Text Data: Making Sense of What Students Tell Us*, walks us through how to extract information from text data and identify software to assist in the process. Their examples illustrate text mining with different types of written artifacts and may inspire you to tackle your text data with renewed confidence.

Do you have a solution to a vexing IR challenge? Please share it with AIR Professional File!

Sincerely,

A handwritten signature in black ink that reads 'Sharron L. Ronco'.

Sharron L. Ronco

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Mining Text Data: Making Sense of What Students Tell Us

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ISSN 2155-7535

AN ALTERNATIVE APPROACH: USING PANELS TO SURVEY COLLEGE STUDENTS

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Acknowledgment

This paper was adapted from a longer paper presented at the annual conference of the Association for Institutional Research in Denver, Colorado, May 2015.

Abstract

Eight short surveys based on select items from the National Survey of Student Engagement (NSSE) were administered to approximately five hundred students over a nine-week period at five diverse colleges and universities. The goal of the experiment was to investigate what impact a survey panel data collection approach

would have on recruitment, survey data quality indicators, and scale properties. Results indicated higher response rates, shorter survey duration, and minimal impact on scale factor structures. However, both cost of incentives and panel member attrition make this alternative survey method less attractive than it would be otherwise.

INTRODUCTION

Survey researchers in higher education are engaged in an uphill battle with declining student response rates. Student cynicism, survey fatigue, and disinterest pose a substantial threat to optimal survey participation (Porter, 2005). Despite significant challenges with the collection of student feedback, demands for evidence-based decisions in higher education continue to increase (Zhang, 2010). In light of these conflicting trends, identifying potential alternatives to standard survey practices may prove useful for a variety of higher education constituents, including institutional researchers and higher education scholars. Some scholars have already seriously considered this issue. For instance, Stern, Bilgen, and Dillman (2014) have proposed survey panels—a group of individuals that have agreed to respond to multiple

future survey completion requests—as a potential solution to declining response rates. Despite today's varied approach to implementing a survey panel, researchers have typically asked a group of individuals the same set of questions at different points in time. Though some academic disciplines, government agencies, and businesses have used survey panels for decades, higher education researchers and administrators have not often employed them to help with their data collection needs (Zhang, 2010).

As a provider of assessment data to hundreds of colleges and universities across North America, and having witnessed its own response rates decline over the past decade, the National Survey of Student Engagement (NSSE) experimented with survey panels at five diverse institutions in spring 2014. The panel administration included eight surveys, with eight to ten items each, administered over nine weeks. Using standard NSSE administration results as a benchmark for each institution, this study documents the impact that using survey panels has on recruitment, survey data quality indicators, and scale reliability and factor structure.

SURVEY PANEL HISTORY

For decades, survey panels have been used in market and medical research (Callegaro et al., 2014; Callegaro & Diogra, 2008). These survey administrations have historically been conducted in person, by phone, and by mail, and have recently transitioned to the Internet (Callegaro et al., 2014). Callegaro et al. estimate that the first online survey panel was administered in the mid-1980s in Europe. About a decade later, this method became popular in the United States. In particular, annual conferences dedicated to public opinion and survey research professionals, such as the one held for the American Association for Public Opinion Research (AAPOR), are rife with presentations from for-profit, not-for-profit, and government organizations (AAPOR, 2015). According to Callegaro et al., the benefits of online survey panels are threefold: (1) quick data collection, (2) low administration cost, and (3) sampling efficiency. With a heavy reliance on online student surveys, these benefits may resonate with the needs of institutional researchers and higher education scholars.

National education datasets developed by the federal government have used survey panels for better understanding the backgrounds and academic experiences of college students and their career trajectories. These include such studies as the Baccalaureate and Beyond and the Beginning Postsecondary Students Longitudinal Study (National Center for Education Statistics [NCES], n.d.). These survey

panels are distinct from many of the online survey panels previously discussed because they contact subjects only every few years, and not on a weekly or monthly basis. In terms of college student assessment, few researchers appear to be developing their own survey panels, although some have used them to answer methodological questions related to survey response behavior (Porter & Whitcomb, 2005; Sharkness & Miller, 2014).

Panel Definitions and Design Considerations

Various researchers define survey panels differently, so it is important to clarify definitions. The traditional “panel” definition refers to a longitudinal survey panel that involves asking the same individuals the same questions across different points in time (Callegaro et al., 2014; Goritz, Reinhold, & Batinic, 2000; Hsiao, 2014), with each point in time referred to as a “wave.” This approach is inherently suited for studying particular changes among subjects. Many survey panels have evolved into access panels; an access panel is essentially a “database of potential respondents who declare that they will cooperate for future data collection if selected” (International Organization for Standardization [ISO], 2012, p. 1). One form of panel survey utilizes a split questionnaire approach by dividing longer questionnaires into smaller ones (Raghunathan & Grizzle, 1995). These various panel methods have been used in an effort to minimize missing data (Vriens, Wedel, & Sandor, 2001).

Types

There are two primary survey panel types based on how members join: nonprobability panels and probability panels (Callegaro et al., 2014). Nonprobability panels are open and allow anyone to volunteer to become a panel member. When members self-select into a panel, it is not possible to know the probability of selection, hence the nonprobability label. In contrast, individuals cannot join probability panels unless they have been invited to do so. Probability panels require that “all members of the population of interest have a known, non-zero probability of receiving an invitation to join” (Callegaro et al., 2014, p. 7).

Sampling

Segers and Franses (2014) found that it was difficult to survey every panel member at each point in time because of cost and the potential for nonresponse. To address these concerns, they utilized a rotating sampling method whereby panel members participated for a fixed amount of time with new panel members integrated at each wave. Other sampling methods include continuous, time, randomized, and matrix sampling. Continuous sampling means that the researcher surveys all individuals at each wave for the extent of the project. Time sampling refers to panel members being surveyed on a regular basis (e.g., biweekly) but not for every wave; they are rotated into waves, helping to ensure data are collected weekly, for instance, or on some other predetermined schedule. Randomized sampling refers to panel members being chosen at random for

each particular wave. Finally, matrix sampling calls for a panel survey to be divided into groups of questions with panel members answering only one question group (Segers & Franses, 2014).

Incentives

Incentives are frequently used in survey research in an effort to increase response rates, and panel studies are no exception. There are various types of incentives (e.g., guaranteed prepaid, guaranteed postpaid, and lottery). In relation to panel studies, there is conflicting evidence regarding the different incentive types and their effectiveness. Goritz (2006) found that cash lotteries (both one large prize and multiple smaller prizes) did not reliably increase panel response or retention rates. In a study on the impact of individual payment on a three-wave longitudinal experiment, Goritz, Wolff, and Goldstein (2008) found that guaranteed payments had a negative effect on the first wave and a positive effect on the second wave. Additionally, after a review of the literature, Callegaro et al. (2014) found that postpaid incentives are most impactful when the members have prior experience or knowledge of the organization administering the survey. None of these studies used a college student population so the current study should shed light on incentive effectiveness, and, more specifically, on guaranteed prepaid incentives.

This study was based on a probability panel that used a split-questionnaire design with continuous sampling, and both guaranteed prepaid and lottery incentives.

STUDY RATIONALE AND RESEARCH QUESTIONS

Though aggregate response rates for NSSE have slowly declined for years (the 2014 administration being a recent exception), they are still high enough to reliably estimate institution-level engagement for the vast majority of participating schools. As a recent study using NSSE data has shown, low response rate estimates of student engagement are very similar to estimates based on high response rates (Fosnacht, Sarraf, Howe, & Peck, in press). Nevertheless, it is incumbent on NSSE and other higher education researchers to look closely at alternative data collection methods to see if there are more-effective ways to collect student feedback. Whether or not minimal response rates and respondent counts can estimate institution-level engagement sufficiently, low response rates matter to skeptical audiences who believe higher response rates are required for decision making. If response rates drop precipitously for a significant number of institutions in the future, those interested in student opinion may need to rely more heavily on other data collection methods, such as focus groups, nonprobability sample surveys, and/or survey panels to supplement their standard survey administrations.

The following research questions guide this study and help us assess whether survey panels can serve NSSE and the wider institutional research community. Questions are grouped into three general areas for assessing the viability

of panels: (1) recruitment, (2) survey data quality indicators, and (3) scale reliability and factor structure.

Recruitment

1. What percentage of students tried to register for the NSSE survey panel, and how do these rates compare to standard administration invitation response rates?
2. What were claim rates for the panel's guaranteed incentives?
3. How do panel members compare demographically to non-panel members and to standard administration respondents?

Survey Data Quality Indicators

4. What are response rates to individual panel surveys, and how do they compare to standard administration rates?
5. What are survey duration and completion results by administration type?

Scale Reliability and Factor Structure

6. Do panel and standard survey administration methods produce similar scale scores?
7. Does the factor structure of scales vary by survey administration method?

Study Background

Data Source and Sample

To address the research questions, we combined NSSE standard administration survey data with panel data for five colleges and universities. These institutions differed by size (total undergraduate enrollment), status (public or private), and designation (college or university).¹ To preserve the anonymity of the five study institutions, we have named them Small Private College, Small Private University,

Medium Public University, Medium Private University, and Large Public University.

Each institution participated in the 2013 standard administration with the exception of the Large Public University; that university's data came from an experimental 2014 standard administration that used a smartphone-optimized version of NSSE. All five institutions participated in a spring 2014 administration using survey panels. In fall 2013 NSSE staff contacted 12 diverse colleges and universities to offer them an experimental, no-cost survey panel administration during the following semester (spring 2014). NSSE staff selected five of the six institutions that expressed interest.

Because of other survey commitments at the Large Public University, NSSE staff randomly selected 25% of all first-year and senior students to participate in either the panel or smartphone experiments, and then followed up by randomly assigning the selected students to either the panel or the standard administrations. The other four institutions provided all first-year student and senior records for sampling. Though not part of the original research design, the concurrent panel and standard administrations for the Large Public University allow for stronger claims about panels, whereas at the other institutions we compare results obtained at different times and from different student populations.

We analyzed 3,331 respondents from both administration types: 2,832 standard administration and 499 panel respondents. Of that total, 67% were female, 17% were underrepresented minority, and 6% were part-time students. With the exception of sex, these demographics reflect missing data for some institutions. We also used 12,272 first-year student and senior non-panel members from the 2014 panel administration to assess recruitment success and panel composition; this included 1,900 students at the Large Public University assigned to the experiment, which represents a fraction of all its first-year students and seniors.

Panel Administration Details

Our goal was to recruit 50 first-year students and 50 seniors from each institution. We drew repeated random student samples by institution and class level in order to send panel registration invitation e-mails; we sent registration invitations to 6,595 students, ranging from 650 to 1,950 per institution. Invitations emphasized that each of the eight surveys would take about one minute to complete. We sent students only one panel registration e-mail and concluded the registration process over about two days. Those that attempted to register after all one hundred openings had been filled were told that it would no longer be possible to join the project. As promised in the registration invitation e-mail, all panel members could immediately retrieve a \$10 Amazon.com gift card using an online portal that was created for the

study. Additionally, the registration e-mail informed students that the names of students who completed all eight panel surveys would be included in a drawing for one \$250 Amazon.com gift card at each school.

Upon registration, students received an e-mail requesting they complete the first survey, followed by a reminder e-mail two or three days later if they had not responded. Approximately every week we delivered another e-mail invitation and follow-up reminder for another panel survey. As the administration for each survey began, we also posted the survey link to the online portal. It took approximately nine weeks to administer all eight surveys. During the last week, a final reminder was delivered to students who had not completed all eight surveys, encouraging them to log in to the online portal to complete all surveys.

Standard Administration Details

As part of a standard NSSE administration, all first-year and senior students received survey recruitment messages sometime between February and May, and the survey officially closed on June 1. As with all institutions, NSSE sent students at the five study schools five e-mail recruitment messages. Institutions decided to use survey incentives to boost response rates and, when appropriate, they included related text in all recruitment messages. Each recruitment e-mail included a URL that linked to the online survey and to

¹ The labels "small," "medium," and "large" signify that total undergraduate enrollment is either fewer than 5,000 (small), between 5,000 and 15,000 (medium), or more than 15,000 (large).

Table 1. NSSE Panel Survey Content

Survey #	Topics	Survey Item Count
1	Collaborative Learning, Student–Faculty Interaction	8
2	Reflective & Integrative Learning, Academic Major, Class Level	9
3	Higher-Order Learning, Writing Practices, Age	8
4	Quantitative Reasoning, Effective Teaching Practices, Parental Education	9
5	Discussions with Diverse Others, Learning Strategies, Course Challenge, Living Location	9
6	High-Impact Practices, Class Preparation, Reading	9
7	Quality of Interactions, Number of Courses Taken (overall and online), Race	8
8	Supportive Environment, Other Institution Experience	10

the informed consent statement. The informed consent statement advised students that the survey would take a total of between 15 and 18 minutes to complete. Though we did not use available data for this study, institutions could append topical module item sets ranging in content from academic advising to civic engagement, and participate in a consortium that administered additional items.

Survey Content

The 2013 standard administration survey included approximately 104 survey items.² The eight experimental panel surveys, however, had 70 items combined (see table 1). The panel administration incorporated arguably the most important topics from the standard instrument, including survey items from 10 primary scales used for

official NSSE reporting and several other important student experiences, background, and demographic items, including academic major and parental education. Panel survey content order did not follow the standard core instrument’s layout. For a complete list of panel survey items, readers may contact the authors at nsse@indiana.edu.

STUDY FINDINGS

Recruitment

1. What percentage of students tried to register for the NSSE survey panel, and how do these rates compare to standard administration invitation response rates? After a single e-mail invitation, between 6% and 20% of invited students registered, or attempted to register, for the panel administration

at the five participating institutions (see table 2). The proportion that responded varied significantly by institution, overall, and by class level ($p < .001$). At all but one institution, a lower proportion of first-year students than seniors registered for the panel study. Differences in registration rates favored seniors by 2 to 8 percentage points. Compared to the standard administration response to the first recruitment message, interest in the panel was appreciably higher at all five institutions. The Small Private College showed the greatest difference with 8 percentage points (12% standard administration rate versus 20% panel rate), while the Small Private University and the Medium Private University showed the least, with a 2 percentage point difference at each.

²For a survey facsimile, see NSSE (n.d.b).

Table 2. Initial Response to Participation Request by Administration Type

	Panel Registration ^b					
	Standard Administration ^a	Overall	First-Year Students (FY)	Seniors (SR)	FY vs. SR (X ²)	Panel Gift Card Retrieval Rate
Small Private College	12.0%	20.0%	17.4%	23.0%	+	78.0%
Small Private Univ.	10.0%	12.4%	9.4%	17.4%	***	75.0%
Medium Public Univ.	2.0%	6.9%	6.0%	8.0%	+	78.0%
Medium Private Univ. ^c	4%	6.0%	6.9%	5.4%		79.8%
Large Public Univ.	2.0%	9.3%	7.0%	11.4%	**	81.0%
X ²	n/a	***	***	***		

Note: + p < .1; * p < .05; ** p < .01; *** p < .001 (X²-test)

^a Standard administration results reflect response rate five days after initial invitation to complete survey.

^b Panel registration results reflect total registered panel members and unsuccessful registration attempts divided by the total number of registration invitations delivered. Approximately 105 students across all five schools tried to register but were not included in the panel because of the 100 student quota per institution.

^c This institution offered an incentive for completing the standard administration survey.

2. What were claim rates for the panel's guaranteed incentives?

Overall, 78% of the 499 panelists claimed their \$10 Amazon.com gift card. There was no statistically significant difference in claim rates among institutions (table 2). Claim rates were also unrelated to class level: 76.2% of first-years and 80.4% of seniors claimed their incentives.

3. How do panel members compare demographically to non-panel members and standard survey administration respondents?

Panel members appeared very similar to non-panel members at each institution for two of the

three demographic variables we analyzed: full-time enrollment and underrepresented minority status (see table 3). We found no statistically significant differences for these two demographic variables at the five institutions. However, for four of the five (the Large Public University being the exception), there was a 10 to 17 percentage point greater proportion of females among panel members compared to non-panel members.

In terms of these demographic variables, panel members were generally comparable to standard administration respondents at each institution, as well. We see a single

statistically significant difference in the proportion of females by administration type across the five schools: 51% of the Large Public University's panel members were female whereas 62% of its standard administration respondents were female.

Survey Data Quality Indicators

4. What are response rates to individual panel surveys, and how do they compare to standard administration rates?

Panel survey response rates at the five institutions ranged from 95% for the Small Private College's first survey to 71% for the Medium Private University's seventh survey (table 4). All institutions

Table 3. Panel Member Characteristics Compared to Non-Panel Members and Standard Administration Respondents by Institution

		Female	Sig.	Full-Time	Sig.	Minority	Sig.
Small Private College	Panel member	74%		99%		11%	
	Non-panel member	57%	*	99%		10%	
	Standard respondent	78%		100%		9%	
Small Private Univ.	Panel member	70%		97%		n/a	
	Non-panel member	57%	*	97%		n/a	
	Standard respondent	62%		97%		5%	
Medium Public Univ.	Panel member	63%		94%		18%	
	Non-panel member	53%	*	90%		19%	
	Standard respondent	65%		91%		18%	
Medium Private Univ.	Panel member	75%		91%		25%	
	Non-panel member	60%	*	89%		28%	
	Standard respondent	71%		93%		24%	
Large Public Univ.	Panel member	51%		n/a		n/a	
	Non-panel member	49%		n/a		n/a	
	Standard respondent	62%	*	n/a		n/a	

Note: * $p < .05$ (χ^2 -test)

had response rates over 90% for the first survey; rates for the eighth survey ranged from 72% to 86%. With the exception of the second survey, statistical tests indicate that response rates to individual panel surveys do not vary across institutions. As is common with panel administrations, response rates declined across the eight panel surveys. Percentage drops in response rates from the first to the eighth survey

ranged from 11% for the Small Private College to 21% for the Medium Private University. Standard administration response rates ranged from 34% for the Small Private College to 12% for the Large Public University. In all cases, response rates for panel surveys far exceeded final rates for corresponding standard administrations at each institution.

5. What are survey duration and completion results by administration type?

Analysis showed that all panel surveys averaged a total of 9.2 minutes to complete, compared to 11.7 minutes for standard survey core items. If a panel member completed one item in a survey, he or she almost always completed all the items.

Table 4. Response Rates by Administration Type

	Panel Surveys									Standard Administration	
	1	2	3	4	5	6	7	8	Panel Members (n)	Response Rate	Respondents (n)
Small Private College	95%	93%	85%	85%	84%	84%	84%	86%	100	34%	333
Small Private Univ.	92%	83%	80%	77%	78%	78%	78%	78%	100	28%	341
Medium Public Univ.	92%	88%	84%	83%	81%	80%	79%	76%	100	15%	753
Medium Private Univ.	93%	78%	79%	74%	72%	73%	71%	72%	99	21% ^a	718
Large Public Univ.	91%	83%	81%	80%	77%	78%	77%	75%	100	12% ^b	308
χ^2		*								n/a	

Note: * $p < .05$ (χ^2 -test)

^a Institution offered an incentive for responding to the standard administration survey invitation.

^b Institution offered incentive after initial invitation; a random sample of students was used for this school's administration.

Table 5. Average Number of Panel Surveys Completed and Survey Completion Rates by Administration Type

	Panel Surveys Completed (of 8)	Completion Rate ^a		Sig.
		Panel	Standard Administration	
Small Private College	7.1	81%	73%	
Small Private Univ.	6.8	73%	81%	+
Medium Public Univ.	6.7	76%	77%	
Medium Private Univ.	6.3	66%	80%	**
Large Public Univ.	5.6	72%	n/a	
χ^2	**	–	–	

Note: + $p < .1$; ** $p < .01$ (χ^2 -test)

^a Completion rate defined as the percentage of respondents completing 90% of all survey items.

However, not all panel members completed every survey. Panel members completed an average of 6.5 out of 8 surveys with notable variation across institutions (table 5). Students at the Large Public University completed 5.6 surveys on average, whereas those at the Small Private College completed 7.1.

Completion rates, defined as the proportion of students completing at least 90% of standard NSSE items or all survey panel items combined, favored the standard administrations of the Small Private University and the Medium Private University by 8 and 14 percentage points, respectively. In contrast, the Small Private College and the Medium Public University showed no statistically significant differences. We could not reliably calculate the Large Public University completion rates for the mobile-optimized experimental administration due to a programming error.

Scale Reliability and Factor Structure

Knowing that a panel administration approach would not substantially change psychometric scale properties is very important to assessing overall panel viability. In order to shed light on this issue, we answered two questions using NSSE scales, otherwise known as engagement indicators (EIs).³ EI scores measure the frequency with which students engage in various educationally enriching behaviors, students' perceptions of campus

support, and the quality of students' interactions with different groups, such as faculty and other students.

6. Do panel and standard survey administration methods produce similar scale scores?

To assess the reliability of EI scores, we compared these scores by administration type for both first-year students and seniors. Differences in EI scores might be attributed to the fewer number of panel respondents relative to the standard administration, or to unknown changes that occurred at campuses in the one-year lapse between administrations, although we would not expect meaningful differences unless an institution undertook major programmatic changes. To determine whether EI scores differed by administration type, we first calculated effect sizes by subtracting the standard administration EI score from the panel EI score and dividing the difference by the standard administration EI standard deviation. We then reported and evaluated the absolute values of the effect sizes by using guidelines developed by NSSE staff suggesting that an effect size of .1 is considered small, .3 is considered medium, and .5 is considered large (Rocconi & Gonyea, 2015). We used t-tests to determine whether any differences were statistically significant at the .1 alpha level after applying a correction for false discovery rates, which is a concern when conducting multiple tests concurrently (Benjamini & Hochberg, 1995).

Our study suggests that both survey administration approaches generally yield similar results (table 6). Out of the 100 comparisons, only nine showed both meaningful and statistically significant differences, ranging from .36 to .81 effect size. Most notably, the Large Public University, which had the methodological advantage of concurrent random assignment into either the panel or standard administration, showed no differences. For the 20 comparisons for each institution, we see anywhere between zero and three notable differences. For senior populations at the Small Private University and the Medium Public University we found two notable differences, which represents the greatest class-specific discrepancy for any institution. In terms of certain scales that may present particular challenges, Quantitative Reasoning appears to have the greatest difference between the two survey administration approaches.

7. Does the factor structure of scales vary by survey administration method?

We used multi-group confirmatory factor analysis to test for measurement invariance (or consistent factor structure) by the two types of survey administration methods. Confirming measurement invariance ensures that scores relate "to the same set of observations in the same way in each group" (Borsboom, 2006), which allows the researcher to reliably draw conclusions from intergroup comparisons. Based on multiple

³ The 10 EIs analyzed are (1) Higher-Order Learning, (2) Reflective and Integrative Learning, (3) Learning Strategies, (4) Quantitative Reasoning, (5) Collaborative Learning, (6) Discussions with Diverse Others, (7) Student-Faculty Interaction, (8) Effective Teaching Practices, (9) Quality of Interactions, and (10) Supportive Environment. For more information about EIs, see NSSE (n.d.a).

Table 6. NSSE Engagement Indicator Effect Sizes Comparing Panel and Standard Administration Scores

Class Level	Engagement Indicator	Small Private College	Small Private Univ.	Medium Public Univ.	Medium Private Univ.	Large Public Univ.
First-Year	Higher-Order Learning	0.05	0.55 *	0.01	0.28	0.01
	Reflective & Integrative Learning	0.15	0.28	0.18	0.16	0.08
	Learning Strategies	0.11	0.29	0.11	0.29	0.28
	Quantitative Reasoning	0.81 *	0.48	0.29	0.01	0.31
	Collaborative Learning	0.10	0.11	0.09	0.13	0.14
	Discussions with Diverse Others	0.24	0.07	0.13	0.23	0.22
	Student–Faculty Interaction	0.14	0.07	0.34	0.14	0.44
	Effective Teaching Practices	0.20	0.02	0.22	0.22	0.16
	Quality of Interactions	0.00	0.00	0.29	0.03	0.14
	Supportive Environment	0.04	0.01	0.45 *	0.14	0.05
Senior	Higher-Order Learning	0.01	0.03	0.28	0.24	0.01
	Reflective & Integrative Learning	0.08	0.02	0.19	0.06	0.19
	Learning Strategies	0.28	0.15	0.25	0.30	0.14
	Quantitative Reasoning	0.31	0.33	0.36 *	0.42 *	0.02
	Collaborative Learning	0.14	0.46 *	0.00	0.14	0.16
	Discussions with Diverse Others	0.22	0.03	0.08	0.21	0.01
	Student–Faculty Interaction	0.44 *	0.10	0.18	0.00	0.09
	Effective Teaching Practices	0.16	0.24	0.32	0.30	0.21
	Quality of Interactions	0.14	0.53 *	0.09	0.10	0.09
	Supportive Environment	0.05	0.09	0.52 *	0.22	0.13

Note: * $p < .1$ (t-test)

confirmatory factor analysis model results, we grouped each of the 10 scales for both class levels into one of five increasingly invariant (or consistent factor structure) categories: (1) variant, (2) configural invariance, (3) weak factorial invariance, (4) strong factorial invariance, and (5) strict factorial invariance.⁴ In order for NSSE to use survey panels for measuring any specific EI score in the future (and to compare these results to standard survey administration results), strong or strict factorial invariance for each scale by class level would be needed.⁵

Our results indicated that 8 out of 10 first-year student EIs met the criteria for strict factorial invariance. Higher-Order Learning and Supportive Environment met the lesser criteria for strong factorial invariance. Senior year results indicated that five EIs had strict factorial invariance while three had strong factorial invariance. Higher-Order Learning and Supportive Environment results indicated variant factor structures between panel and standard administrations, which would make any inter-administration comparisons untenable.

LIMITATIONS, DISCUSSION, AND CONCLUSIONS

Limitations

There are several limitations associated with this study's design and analyses. First, results for four of the five study institutions came from comparing potentially different student populations during the spring 2013 and spring 2014 semesters, which could have unknown effects on study outcomes. Second, we guaranteed that all panel members would receive a \$10 Amazon.com gift card incentive as well as a chance to win a \$250 Amazon.com gift card, whereas standard administration sample members at three institutions did not get any incentive and the other two conducted lotteries. Making any firm conclusions about the relative attractiveness of panels is therefore confounded; the incentives could have impacted data quality outcomes, especially because they relate to survey completion. Related to this point is whether any selection bias exists given that panel members chose to join the panel after just one registration e-mail. Although we reviewed several key demographics and determined that panel members were generally representative, they may still be different in unknown ways that influence engagement results. Finally, given the relatively small number of panel respondents at each

institution, we could not analyze results by subgroups. This study's results may not offer sufficient information for those who typically review survey results by academic major fields or other subpopulations.

Discussion

This study provides various insights about college student survey panels, one possible alternative to the standard survey administration approach used by NSSE, other national survey projects, and many institutional research offices. Foremost among our findings, panel-registered students from all five study institutions responded to panel surveys at very high rates (70% or more), far above response rates for corresponding standard administrations. These findings support the idea of Stern et al. (2014) suggesting survey panels may be one solution for declining response rates.

As social exchange theory might suggest, these high response rates likely stem from the minimal cost of participation (cost for each survey was about a minute answering relatively innocuous questions) in relation to several perceived benefits, including the incentives offered and the opportunity for students to provide helpful feedback about their college experience. Another valid explanation is that students may feel a strong ethical obligation to participate

⁴ To accomplish this categorization, models were run separately for each administration type until the same model fit both groups well. If no model fit both groups, we rejected measurement invariance and pursued no additional testing. Assuming a model fit both groups well, we then ran tests for the four types of invariance sequentially. Once a lower level of invariance was tested and rejected, we did not proceed with running tests for higher levels of invariance. Criteria used for determining acceptable model fit were $RMSEA < .06$, $Chi-square\ p\text{-value} > .05$, and $CFI/TLI > .90$. Strict factorial invariance required chi-square difference test p -values greater than .05 and ΔCFI values of less than .01.

⁵ For a detailed review of multi-group confirmatory factor analysis methods, see Little and Slegers (2005).

after receiving their \$10 gift card. A guaranteed incentive of this amount is generally unheard of among NSSE standard administrations and may not be a particularly realistic amount for some institutions to offer students, especially if they want more than 100 panel members. For this reason, we encourage others to experiment with lowering the incentive's dollar value to minimize expenditures but without sacrificing too much on response rates. The survey methodology literature on college student panel incentives is thin, if not entirely missing, so further investigation is certainly warranted.

With the exception of gender, we also found panel members to be similar to non-panel members and standard administration respondents using full-time enrollment and underrepresented minority status. Females traditionally respond to NSSE survey requests at higher rates, so their overrepresentation among panel members is not especially surprising. These results bode well for the use of panel studies since administrators may not have to worry excessively about self-selection bias.

Consistent with similar studies completed in market and medical fields, results indicate, unsurprisingly, that panel studies do offer a rapid way to collect information from students. Panel members answered each of the eight- to ten-item surveys in about a minute with nearly zero item skipping or nonresponse. The short duration and practically nonexistent item nonresponse are other reasons that the panel survey approach may be a viable alternative to standard administration

practices. This study's conclusions differ from the conclusion of Apodaca, Lea, and Edwards (1998) that individuals are reluctant to participate in surveys with multiple components.

In terms of NSSE scales, the vast majority of results indicated scores originating from panels are comparable to those from standard administrations, even with a limited number of respondents. With the exception of two EIs for seniors, scale factor structures do not appear to be affected by the data collection method, something that would be very important for analyzing panel and standard administration results longitudinally. The reasons for Higher-Order Learning and Supportive Environment scales failing invariance testing are unclear at this time. At a minimum, this finding would complicate combining results from these two different survey administrations.

In contrast to these favorable panel results, this study also highlights several issues of concern with using survey panels. Based on our recruitment findings, it does not appear that students perceive panel membership to be significantly more attractive than a standard administration approach, even with the \$10 guaranteed Amazon.com gift card and promises of a minute-long survey each week. There are several possible explanations, such as students weighing the protracted involvement over nine weeks against the incentives provided and determining that the costs actually outweigh the benefits. Second, we saw that panel member attrition drove overall missing data

levels for some institutions to a point that resembles or surpasses standard administration results. Though it is challenging to generalize based on our results, when we look at the percentage of students that complete 90% of all survey items by administration type we can reasonably conclude that completion rates are not always improved by dividing up a longer survey. Variations of this study's panel design, such as rotating panel members to reduce fatigue, may yield more-promising results in terms of missing data levels.

Amidst a growing need for survey data to inform decisions in higher education, students are at increased risk for survey fatigue. Survey panels may offer some relief by limiting the need to administer surveys to entire campus populations. While 100 participants joined the panel and received eight survey invitations, the vast majority of students at each institution did not receive more than a single registration e-mail, thus reducing any potential frustration with multiple requests. High panel response rates may effectively limit the need to send several reminders to sample members. Additionally, we provided students the option to go back and complete previous waves of the survey using an online portal, thereby eliminating the need for several survey reminder messages that could increase perceptions of burden and actual survey fatigue.

Conclusions

College and university students often perceive requests to complete a relatively long 15- to 18-minute survey as burdensome, especially considering

the many other survey requests they receive. This overload of surveys challenges survey administrators to think about more-effective ways to collect student feedback than the customary cross-sectional survey design that NSSE and other survey research projects currently employ. Survey panels represent one data collection alternative that is worthy of further investigation: our results point to high response rates, short completion times, and minimal impact on measurement scales. Panel member attrition and associated missing data levels, however, makes this option potentially problematic. The price for encouraging panel membership by using incentives may be cost prohibitive to some as well, especially if the researcher needs significantly more panel members for analyzing campus subpopulations. Our hope is that others will start experimenting with panels to see if there are ways to address these issues. Obviously, we do not know what the future holds for the standard survey administration approach, but investigating some viable alternatives may prove helpful in the future.

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