

Dissertation Synopsis and Pilot Instrument: Non-Response Bias on Web-based Surveys
As Influenced by the Digital Divide and Participation Gap

Kevin R. Guidry

Indiana University

Higher education scholars, policy makers, and administrators know little about the experiences of undergraduate students who matriculate with minimal experience with technology. It is often assumed that all students, particularly traditionally-aged students, have significant experience with, knowledge of, and comfort with technology. Although that assumption is correct for many students, it is false for others. Moreover, web-based assessment efforts likely are not collecting adequate and accurate data about these students.

Although little is known about these students, there are tantalizing glimpses. National surveys of institutions or students indicate that a significant number of students do not own a computer. National surveys of students have reported different numbers of students without computers, from 1.2% of respondents (Smith, Salaway, & Caruso, 2009) to 2.7% of respondents (Junco & Mastrodicasa, 2007). EDUCAUSE member institutions report that between 10% and 20% of their students do not own computers (EDUCAUSE, 2009). Similarly, studies have revealed differences in how college students and youths use computers, differences that are significantly influenced by economic and cultural factors such as how easily and often they can use Internet-connected computers (Palfrey & Gasser, 2008; Ito et al., 2010; Watkins, 2009). So it is clear that there are some students who neither own computers nor use them in ways that most of their peers use them.

Problem

No one knows how many of these students are on American college campuses. Little is known about who they are. And very little is known about their experiences and how their technological aptitude is shaping their academic and social experiences. Moreover, no one knows if our current methods of assessment – methods that often rely exclusively on web-based surveys advertised via e-mail – are gathering adequate information from these students and adequately representing their experiences, opinions, and needs.

Purpose

This study will explore the non-response bias of first-year undergraduate students on a self-administered web-based survey. Specifically, this study will examine the impact of those students' previous computer ownership, access, and use on their decision to respond. The specific research questions guiding this dissertation:

RQ1: In this sample of first-year students at American institutions of higher education, how can we describe their different patterns of Internet-connected computer ownership, access, and use?

RQ2: Do students exhibit a significant non-response bias to a Web-based survey based on their previous computer ownership, access, and use?

Methodology

To answer the first question, I will construct a brief survey of previous computer ownership and use to be administered to students participating in the on-campus, paper administration of the Beginning College Survey of Student Engagement (BCSSE) (The pilot survey instrument is attached as Appendix A and notes on the construction of the instrument are in Appendix B). I will answer the second question using data from the same institutions who administer the web-based version of the National Survey of Student Engagement (NSSE). Using the BCSSE data in a linked-records approach (Porter & Whitcomb, 2005), I will be able to use logistic regression (Korkmaz & Gonyea, 2008) to see if students with less exposure to technology respond in numbers proportional to their representation.

If the population is sufficiently diverse, I expect a non-trivial number of students will have had less experience with technology than the majority of their peers. I also expect that they will be disproportionately from lower SESes and racial/ethnic minorities. Finally, I expect to find a small but significant non-response bias on the web-based version of NSSE, a finding that may be generalizable to other web-based self-administered surveys.

References

- Becker, S., Crandall, M. D., Fisher, K. E., Kinney, B., Landry, C., & Rocha, A. (2010). *Opportunity for all: How the American public benefits from Internet access at U.S. libraries*. Washington, DC: Institute of Museum and Library Services.
- EDUCAUSE. (2009). *EDUCAUSE Core Data Service Fiscal Year 2008 summary report*. Boulder, CO: Author.
- Ito, et al. (2010). *Hanging out, messing around, and geeking out*. Cambridge, MA: MIT Press.
- Junco, R., & Mastrodicasa, J. (2007). *Connecting to the net.generation*. Washington, D.C.: NASPA.
- Korkmaz, A., & Gonyea, B. G. (2008). *The effect of precollege engagement on the likelihood of response to the National Survey of Student Engagement*. Poster presented at the Annual Meeting of the Association for Institutional Research, Seattle, WA.
- Palfrey, J., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York, NY: Basic Books.
- Porter, S. R., & Whitcomb, M. E. (2005). Non-response in student surveys: The role of demographics, engagement and personality. *Research in Higher Education*, 46(2), 127–152.
- Smith, S. D., Salaway, G., & Caruso, J. B. (2009). *The ECAR student of undergraduate students and information technology, 2009*. Boulder, CO: EDUCAUSE.
- Watkins, S. C. (2009). *The young & the digital: What the migration to social-network sites, games, and anytime, anywhere media means for our future*. Boston, MA: Beacon Press.

Appendix A

Draft Instrument

Past Internet Access Survey Pilot

I am interested in how and how often you have accessed the Internet during the past 12 months. This is a pilot study—a small scale study to test this survey to identify problems with questions and response options—preceding my PhD dissertation so please let me know of any difficulties you encounter or suggestions you have for improving this survey! You can contact me, Kevin Guidry, at kguidry@indiana.edu or 812-856-0113. And remember to return this survey to Eigenmann 419 (Mon-Fri between 9:00 and 5:00) to receive your \$3 compensation!

Internet Access

1 During the last 12 months...

- a. How often did you use a computer (desktop, laptop, netbook, tablet, etc.) to access the Internet?
- Several times a day 1-2 days a week
 About once a day Every few weeks
 3-5 days a week Less often or never
- b. On a typical day, for how many hours each day did you use a computer (desktop, laptop, netbook, tablet, etc.) to access the Internet?
- 7 hours or more 3 to 4 hours
 6 to 7 hours 2 to 3 hours
 5 to 6 hours 1 to 2 hours
 4 to 5 hours Less than 1 hour
- c. On the computer you used most often to access the Internet, could you connect to all websites (i.e. was the Internet connection censored or filtered)?
- Yes, I could connect to all websites I did not use a computer to access the Internet at all
 No, but I could connect to most websites I do not know
 No, I could only connect to a few websites
- d. When you connected to the Internet on the computer you used most often, were you supervised by parents, teachers, librarians, or others?
- No, I was always unsupervised I did not use a computer to access the Internet at all
 Yes, I was sometimes supervised I do not know
 Yes, I was always supervised
- e. Did you or your family own the computer you used most often to connect to the Internet?
- No, I was always unsupervised I did not use a computer to access the Internet at all
 Yes, I was sometimes supervised I do not know
 Yes, I was always supervised
- f. Did you regularly use multiple computers (your computer, school's computer, library's computer, etc.) to access the Internet?
- Yes, I used multiple computers I did not use a computer to access the Internet at all
 No, I only used one
- g. How often did you use a handheld mobile device (cell phone, Blackberry, iPhone, etc.) to access the Internet?
- Several times a day Once or twice a week
 Once or twice a day Several times a month
 Several times a week Never
- h. Did you regularly use something other than a computer or mobile device (game console, e-book reader, etc.) to access the Internet?
- Yes, I accessed the Internet using other devices I did not access the Internet at all
 No, I only accessed the Internet using a computer or mobile device

2 How will you access the Internet on a regular basis during your next year in college? (Select all that apply.)

- I will use my own computer I will use something other than a computer (cell phone, game console, etc.)
 I will use my family's computer I will not access the Internet
 I will use someone else's (friend, roommate, etc.) computer I do not know
 I will use computers on campus (computer labs, library, etc.)

Additional Information

3 Did you receive a Federal Pell Grant?

- Yes I do not know
 No

4 What is your sex?

- Female Male

5 What is your racial or ethnic identification?(Select only one.)

- American Indian or other Native American
 Asian, Asian American, or Pacific Islander
 Black or African American
 White (non-Hispanic)
 Mexican or Mexican American
 Puerto Rican
 Other Hispanic or Latino
 Other
 I prefer not to respond

6 Please indicate whether your parents completed a 4-year college degree.

	Completed 4-year degree	Did not completed 4-year degree	Do not know
Mother (or guardian)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Father (or guardian)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7 Please indicate if you have any questions about this survey, difficulties completing it, or suggestions to improve it. Please continue writing on the back if necessary.

Past Internet Access Survey Cognitive Interview

I am interested in how and how often undergraduate students have accessed the Internet during the past 12 months. This specific survey is being used in a cognitive interview. During this interview, you will be asked to read the questions and responses out loud. As you answer the question, please “think out loud” and help me understand how you arrived at your answer. As you progress through the survey, please continue thinking out loud as you read each question so I can understand how *you* understand each question. This process will help refine and improve this survey before it is actually administered to your fellow students.

Internet Access

1 During the last 12 months...

- a. How often did you use a computer (desktop, laptop, netbook, tablet, etc.) to access the Internet?
- | | |
|--|--|
| <input type="checkbox"/> Several times a day | <input type="checkbox"/> 1-2 days a week |
| <input type="checkbox"/> About once a day | <input type="checkbox"/> Every few weeks |
| <input type="checkbox"/> 3-5 days a week | <input type="checkbox"/> Less often or never |
- b. On a typical day, for how many hours each day did you use a computer (desktop, laptop, netbook, tablet, etc.) to access the Internet?
- | | |
|--|---|
| <input type="checkbox"/> 7 hours or more | <input type="checkbox"/> 3 to 4 hours |
| <input type="checkbox"/> 6 to 7 hours | <input type="checkbox"/> 2 to 3 hours |
| <input type="checkbox"/> 5 to 6 hours | <input type="checkbox"/> 1 to 2 hours |
| <input type="checkbox"/> 4 to 5 hours | <input type="checkbox"/> Less than 1 hour |
- c. On the computer you used most often to access the Internet, could you connect to all websites (i.e. was the Internet connection censored or filtered)?
- | | |
|---|---|
| <input type="checkbox"/> Yes, I could connect to all websites | <input type="checkbox"/> I did not use a computer to access the Internet at all |
| <input type="checkbox"/> No, but I could connect to most websites | <input type="checkbox"/> I do not know |
| <input type="checkbox"/> No, I could only connect to a few websites | |
- d. When you connected to the Internet on the computer you used most often, were you supervised by parents, teachers, librarians, or others?
- | | |
|--|---|
| <input type="checkbox"/> No, I was always unsupervised | <input type="checkbox"/> I did not use a computer to access the Internet at all |
| <input type="checkbox"/> Yes, I was sometimes supervised | <input type="checkbox"/> I do not know |
| <input type="checkbox"/> Yes, I was always supervised | |
- e. Did you or your family own the computer you used most often to connect to the Internet?
- | | |
|--|---|
| <input type="checkbox"/> No, I was always unsupervised | <input type="checkbox"/> I did not use a computer to access the Internet at all |
| <input type="checkbox"/> Yes, I was sometimes supervised | <input type="checkbox"/> I do not know |
| <input type="checkbox"/> Yes, I was always supervised | |
- f. Did you regularly use multiple computers (your computer, school's computer, library's computer, etc.) to access the Internet?
- | | |
|---|---|
| <input type="checkbox"/> Yes, I used multiple computers | <input type="checkbox"/> I did not use a computer to access the Internet at all |
| <input type="checkbox"/> No, I only used one computer | |

- g. How often did you use a handheld mobile device (cell phone, Blackberry, iPhone, etc.) to access the Internet?
- | | |
|---|--|
| <input type="checkbox"/> Several times a day | <input type="checkbox"/> Once or twice a week |
| <input type="checkbox"/> Once or twice a day | <input type="checkbox"/> Several times a month |
| <input type="checkbox"/> Several times a week | <input type="checkbox"/> Never |
- h. Did you regularly use something other than a computer or mobile device (game console, e-book reader, etc.) to access the Internet?
- | | |
|---|---|
| <input type="checkbox"/> Yes, I accessed the Internet using other devices | <input type="checkbox"/> I did not access the Internet at all |
| <input type="checkbox"/> No, I only accessed the Internet using a computer or mobile device | |

2 How will you access the Internet on a regular basis during your next year in college? (Select all that apply.)

- | | |
|--|--|
| <input type="checkbox"/> I will use my own computer | <input type="checkbox"/> I will use something other than a computer (cell phone, game console, etc.) |
| <input type="checkbox"/> I will use my family's computer | <input type="checkbox"/> I will not access the Internet |
| <input type="checkbox"/> I will use someone else's (friend, roommate, etc.) computer | <input type="checkbox"/> I do not know |
| <input type="checkbox"/> I will use computers on campus (computer labs, library, etc.) | |

Appendix B

Survey Instrument Notes

The primary concept I am hoping to capture with this instrument is Internet access. Specific dimensions of access include: frequency, openness (i.e. filtered or unfiltered), supervision, ownership, and location. These are derived largely from qualitative work that has been conducted over the past five years, work that has explored how young people access and use the Internet (Ito et al, 2010, Palfrey & Gasser, 2008, Watkins, 2009, etc).

Originally, I hoped that a single continuous latent construct would underlie this instrument and its questions. However, it seems clear that there are multiple related but distinct sub-constructs underlying access. I believe and hope that the responses to these questions will be related such that I can – without losing too much nuance and context – combine the responses to these questions into one or two scales that are easy to understand and use.

Initial Construction

In constructing this instrument, I looked at many other instruments that ask about computer ownership and use. Although most of these instruments were of limited utility in that nearly all focused on present computer ownership and Internet access with few questions focusing on retrospective ownership and access, basing this instrument on existing instruments and research helps establish face validity. Most notable among the many resources I examined are the following multi-year studies:

- ECAR Study of Undergraduate Students and Information Technology surveys (2004-2009)
- North Carolina State University ResNet surveys (1998-2009)
(http://ncsu.edu/resnet/general_info/surveys.php)

- Oxford Internet Surveys (2003, 2005, 2007)
(<http://www.oii.ox.ac.uk/microsites/oxis/methodology.cfm>)
- Pew Internet & American Life survey questions (<http://pewinternet.org/Data-Tools/Explore-Survey-Questions.aspx>)
- Stanford University Residential Computing annual surveys (2000-2009)
(<http://rescomp.stanford.edu/info/survey/>)
- U.S. Bureau of Labor Statistics and Bureau of the Census Internet and computer use questionnaires (1994, 1997, 1998, 2000, 2001, 2003)
(<http://www.bls.census.gov/cps/computer/computer.htm>)

The 2010 U.S.IMPACT Study (Becker et al.) also deserves particular mention as one study that specifically focused on where, how, and why respondents accessed the Internet during the past 12 months. The web survey instrument employed by Becker et al. was particularly informative as it is very recent and deals with issues that are only now becoming an issue for researchers in this field. For example, the wording they used to describe mobile devices (“a handheld mobile device like a cell phone, Blackberry, or iPhone,” Appendix 5, p. 2) was very instructive. The thorough process employed by Becker et al. to develop their instrument (described in Appendix 1 in their final report) makes it particularly informative and useful.

The demographic questions on this pilot instrument were taken directly from the current paper version of BCSSE. These questions will not be included in cognitive interviews but they will be included in pilot administrations of this instrument. Previous research indicates that responses to most of these demographic questions should correlate to responses to the technology questions and thus provide evidence of validity. Gender should not correlate with most of these questions and will thus serve as a useful test of validity.

Content Validity

To establish the content validity of this instrument, drafts of the instrument were sent to several experts. Three content experts with expertise in college student technology support were consulted:

- Carol Anderer, Associate Director of Client Support & Services, University of Delaware
- Jan Gerenstein, Associate Director of Residential Technology, Northern Illinois University
- Rich Horowitz, Director of Academic Computing Services, Stanford University

Additionally, five researchers with expertise in survey design and analysis of survey data were consulted:

- Jim Cole, Beginning College Survey of Student Engagement (BCSSE) Project Manager, Center for Postsecondary Research (CPR), Indiana University
- Robert Gonyea, Associate Director, CPR, Indiana University
- Ali Korkmaz, Associate Research Scientist, CPR, Indiana University
- Amber Lambert, Assistant Research Scientist, CPR, Indiana University
- Tom Nelson-Laird, Faculty Survey of Student Engagement (FSSE) Project Manager, CPR, and Assistant Professor, Indiana University

In response to feedback offered by these reviewers and further analysis of available surveys and literature, the following changes were made to the initial draft of the instrument:

1. Changed response options to “How often did you use a computer” question to match Pew response set (the previous response set was already nearly identical so this was a small adjustment).
2. Added parenthetical examples defining a “computer.”

3. Added question asking “How many hours each day did you use a computer.” Used Pew response sets as starting point and increased upper limit based on reported average weekly computer use.
4. Added question specifically asking about cell phone and remove cell phone from “other” question.
5. Changed “mobile phone” to “mobile device” both in response to suggestions from reviewers and as used in Becker et al. (2010).
6. Tweaked question asking about using multiple computers; previous wording suggested it was only about computer use in multiple locations.
7. Removed contractions.
8. Reordered response options so that “I do not know” is always last.