What is the Impact of Smartphone Optimization on Long Surveys?

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National Survey of Student Engagement
Indiana University Bloomington

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Widespread adoption of mobile technologies has dramatically impacted the landscape for survey researchers (Buskirk & Andrus, 2012), and those focusing on college student populations are no exception.

Optimizing surveys for smartphones is of interest to many but ideal formats are still being developed.

This study investigated the impact that one smartphone optimization approach had on a long college student survey.
National Survey of Student Engagement

- NSSE aims to understand the curricular and co-curricular engagement of first-year and senior college students using over 100 survey items.

- Since 2000, ~ 5 million students from about 1,500 US and Canadian institutions participated.

- Formatted for “computer” though increasing numbers use smartphones to complete.
Research Questions

Are there differences in respondent characteristics by smartphone optimization status.

How does optimization impact:

a) early abandonment,
b) completion,
c) item nonresponse,
d) duration,
e) straight-lining,
f) subjective evaluations, and
g) measurement invariance for scales?
Study Details

• NSSE 2015 winter/spring administration
• 10 US colleges/universities
• Sample: 38,245 first-year & senior students
• Sample divided equally by smartphone optimization availability
• 7,735 respondents; 7,347 included in study
During the current school year, about how often have you done the following?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Often</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked questions or contributed to course discussions in other ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepared two or more drafts of a paper or assignment before turning it in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Came to class without completing readings or assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended an art exhibit, play, or other arts performance (dance, music, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asked another student to help you understand course material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explained course material to one or more students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepared for exams by discussing or working through course material with other students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worked with other students on course projects or assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gave a course presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During the current school year, about how often have you done the following?

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<th>Very Often</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined ideas from different courses when completing assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connected your learning to societal problems or issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Optimized – Vertical Position

During the current school year, about how often have you done the following?

- Prepared two or more drafts of a paper or assignment before turning it in
  - Very often
  - Often
  - Sometimes
  - Never

- Come to class without completing readings or assignments
  - Very often
  - Often
  - Sometimes
  - Never

- Attended an art exhibit, play, or other arts performance (dance, music, etc.)
  - Very often
  - Often
  - Sometimes
  - Never

- Asked another student to help you

Unoptimized – Vertical Position

During the current school year, about how often have you done the following?

- Asked questions or contributed to course discussions in other ways
  - Very often
  - Often
  - Sometimes
  - Never

- Submitted or revised drafts of a paper or assignment that containing incorrect
  - Very often
  - Often
  - Sometimes
  - Never

- Attended or completed assignments
  - Very often
  - Often
  - Sometimes
  - Never

- Attended a student to help you understand course materials
  - Very often
  - Often
  - Sometimes
  - Never

- Submitted course materials to one or more teachers
  - Very often
  - Often
  - Sometimes
  - Never

- Prepared for course readings or assignments
  - Very often
  - Often
  - Sometimes
  - Never

- Worked with other students on course projects or assignments
  - Very often
  - Often
  - Sometimes
  - Never

- Gave a course presentation

During the current school year, about how much has your coursework emphasized the following?

- Working with course materials
  - Very much
  - Quite a bit
  - Somewhat
  - Very little

- Applying skills, processes, or methods to practical problems or new situations
  - Very much
  - Quite a bit
  - Somewhat
  - Very little
Results
Respondent Characteristics

- Optimized respondents looked very similar to unoptimized and desktop groups:
  - Gender, Age, Race/Ethnicity, Parental education, Cumulative grades, Part-time enrollment, Academic major

- Statistically significant differences found but not very large
Early Abandonment

Optimized group less likely to abandon the survey upon viewing the very first page of survey items.

<table>
<thead>
<tr>
<th></th>
<th>First-Year Students</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimized</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Unoptimized</td>
<td>26%</td>
<td>22%</td>
</tr>
</tbody>
</table>
Optimization appears to reduce missing data though variation exists between first-year and senior populations.
### Duration

About 18% decrease in duration compared to unoptimized group—even lower than desktop.

<table>
<thead>
<tr>
<th></th>
<th>Optimized</th>
<th>Unoptimized</th>
<th>Desktop</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-Year Students</td>
<td>12.2</td>
<td>15.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Seniors</td>
<td>12.2</td>
<td>14.6</td>
<td>12.9</td>
</tr>
</tbody>
</table>

---

**Graph:**

- **Optimized:** Columns showing duration for First-Year Students and Seniors.
- **Unoptimized:** Columns showing duration for First-Year Students and Seniors.
- **Desktop:** Columns showing duration for First-Year Students and Seniors.
## Straight-lining

**Optimized straight-lined less than unoptimized group**

<table>
<thead>
<tr>
<th></th>
<th>First-Year Students</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optimized</strong></td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Unoptimized</strong></td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Page 1 scales</strong> (out of 6 scales)</td>
<td>1.0</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Page 2 scales</strong> (out of 5 scales)</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Page 3 scales</strong> (out of 3 scales)</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Desktop**

<table>
<thead>
<tr>
<th></th>
<th>First-Year Students</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optimized</strong></td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Unoptimized</strong></td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Page 1 scales</strong> (out of 6 scales)</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Page 2 scales</strong> (out of 5 scales)</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Page 3 scales</strong> (out of 3 scales)</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Subjective Evaluations

Optimization betters ease of use and visual design.

<table>
<thead>
<tr>
<th></th>
<th>Optimized</th>
<th>Unoptimized</th>
<th>Desktop</th>
<th>Optimized</th>
<th>Unoptimized</th>
<th>Seniors</th>
<th>Optimized</th>
<th>Unoptimized</th>
<th>Desktop</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-Year Students</td>
<td>59%</td>
<td>41%</td>
<td>55%</td>
<td>61%</td>
<td>52%</td>
<td>35%</td>
<td>58%</td>
<td>57%</td>
<td>37%</td>
</tr>
<tr>
<td>Seniors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ease of use: "Very easy"
Visual Design: "Excellent"
Measurement Invariance

Across the three groups, all first-year and senior scales met scalar invariance criteria, except for Learning Strategies

<table>
<thead>
<tr>
<th></th>
<th>First-Year Students</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher-Order Learning</td>
<td>scalar</td>
<td>scalar</td>
</tr>
<tr>
<td>Reflective and Integrative Learning</td>
<td>scalar</td>
<td>scalar</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>scalar +</td>
<td>scalar</td>
</tr>
<tr>
<td>Learning Strategies</td>
<td>variant</td>
<td>variant</td>
</tr>
<tr>
<td>Collaborative Learning</td>
<td>scalar +</td>
<td>scalar</td>
</tr>
<tr>
<td>Discussions with Diverse Others</td>
<td>scalar</td>
<td>scalar +</td>
</tr>
<tr>
<td>Student-Faculty Interaction</td>
<td>scalar</td>
<td>scalar</td>
</tr>
<tr>
<td>Effective Teaching Practices</td>
<td>scalar</td>
<td>scalar +</td>
</tr>
<tr>
<td>Quality of Interactions</td>
<td>scalar</td>
<td>scalar</td>
</tr>
<tr>
<td>Supportive Environment</td>
<td>scalar</td>
<td>scalar</td>
</tr>
</tbody>
</table>
Conclusions

• Optimization can improve data quality even for a long survey, while also maintaining scale properties.

• Smartphone optimized respondent data quality rivals that of desktop respondents.

• Some measures indicate differences between younger and older smartphone respondents in the sample. What does this mean for ongoing optimization efforts?

• College student survey developers should focus on optimization as smartphone usage continues to increase.
Thank you!

Copy of this and past presentations can be found at:

nsse.iub.edu/html/publications_presentations.cfm

Additional NSSE information can be found at:
nsse.indiana.edu

Feel free to contact us with any questions regarding this study or NSSE.

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