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Integrating Interactive Geographical Maps in Web-based Surveys



Background – The Study

- Grant funded by the National Institutes of Health
- Ongoing study to track and assess programs targeted at negative consequences of alcohol use among college students in CA public universities
- Focus on community involvement / community organization



Background – The Study

- 14 campus' (public institutions) in the state of California
- Annual data collection for 5 years (just completed 3rd year)
- Sample size of 1-2,000 per school
- Web-based data collection (mailed pre-notification with email reminders)



Background – The Need

- Students drink alcohol, and...
 - With distance comes added negative consequences.
 - With proximity comes more easy access.
- **Geographic location is important, but difficult to accurately obtain in self-administered surveys**



Online Mapping

- Recent advancements in online mapping using Asynchronous JavaScript and XML (AJAX).
 - More responsive to the user
 - Only required portions of the map are downloaded to the user
 - Google maps (<http://maps.google.com>)
- [BLS](#)



Could we use an AJAX map to collect geographic data?

- Issues to consider
 - Technical integration with the survey system
 - Browser compatibility
 - User interface



Web-based Map – Is survey system integration possible?

The answer was Yes, with Google Maps...

So, I asked no more.

But left “feasibility” on the table until proven.



Web-based Map – Browser compatibility

- This could be a problem in some populations.
- Student populations at CA universities had access to recent browsers
- Decided this was not an issue in this study, however, we recognized the need to assess compatibility issues as we proceeded



AJAX Limitation

- Browser limitations

(Source: Wikipedia - <http://en.wikipedia.org/wiki/AJAX>)

- Microsoft Internet Explorer version 5.0 and above
- Mozilla, Mozilla Firefox, SeaMonkey, Epiphany, Galeon and Netscape version 7.1 and above
- Konqueror version 3.2 and above and Apple Safari version 1.2 and above
- Opera browsers version 8.0 and above, including Opera Mobile Browser version 8.0 and above



Web-based Map – Usability?

- Can an non-linear interactive map be usable when integrated into a linear interactive survey?
- Some concerns
 - Integration into survey (survey page or pop up?)
 - Map navigation
 - Zoom
 - Location selection
 - Perceptions of confidentiality
 - Due to precision of the map
 - Due to general concerns of Google confidentiality



Web Survey Map Tool Developed

- Developers designed and implemented the Web-based survey map tool (SSGeo Mapping)
- Basic capabilities
 - Set starting map location
 - Zoom (and control/limitation of zoom)
 - Graphical flag identifying location
 - Pop-up window design (outside of survey)
 - Susceptible to logic (could target specific locations to specific respondents)



Before “Real” Data Collection Use

- Focus on Testing Feasibility / Usability
 - The Usability Question
 - Conduct individual usability tests
 - The Feasibility Question
 - Large scale pilot



Usability Test

- Used 12 undergraduates from U of Michigan
- Questionnaire
 - About 25 items with three or more maps
- Method
 - Subjects worked individually in our usability lab
(a controlled environment on a controlled system)
 - Retrospective think aloud interview following use of interface



Usability Testing

- General
 - Some respondents appeared to be less than savvy at using a map
- Navigation / Use of Map Tool
 - Zoom Problems
 - Zoom limits were not clear
 - Move Map Problem
 - Click and Drag was not clear
 - Confusion with “arrow click” navigation scheme

[Example](#)



Usability Testing

- Confidentiality findings
 - Concern was not existent
 - No “Google effect”
 - Precision was no concern



Feasibility Test

- Map interface was included in full data collection, as a pilot interface
 - Fall 2005 data collection
 - Simultaneous with the usability testing (identical interface)
 - $n=14,000$



Key Results

- “Please identify approximately where you live on this map.”
- 88.9% provided a location
 - 5.2% purposefully did not provide a location
 - 5.9% reported they were not able to open the map or the map “didn’t work”
- No significant increase in break-off at map location



Key Results

- Distribution of residences plotted into areas as expected

Example of the plot from a subset of respondents on one campus.



Overall Findings

- Using an AJAX enabled map in a Web-based survey is feasible and usable (at least in a student population).
- Much more work needs to be done to fine tune the interface and identify error sources.



Next Steps

- Code respondent address data and compare with map location selected for where they live – can we validate map data?
- Connect data collected on browser type for those who reported the map didn't work – are there compatibility issues?



Next Steps

- Improve zoom/map navigation interface
- Explore alternatives to map for those who are not “map literate”