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## User Centered Designed Link Labeling: Face-to-Face Versus Web-based Inquiries

Information designers and information architects often face the task of creating intuitive link names that website users understand and relate to. Determining the appropriate wording and context for links is challenging, but information designers and information architects have a few tools to assist in the process. Writing for the web guidelines and other web design principles are important and useful, but receiving feedback from actual users helps designers know what words and frameworks are expected. Card sorting and a labeling exercise are intended to elicit feedback about how users conceptualize information intended for a particular website. For some reason, however, the labeling activity, which used to accompany card sorting, has been mostly abandoned while card sorting still remains part of design practice. Current scholarship and research about writing for the web and link naming make a compelling case for re-establishing the labeling activity with card sorting, better assisting information designers and information architects in writing effective links. Since card sorting has migrated to web interfaces, understanding how to conduct the labeling activity over the Internet is appropriate. This paper presents the case for a user centered design link labeling activity and compares the results and benefits of online link labeling versus face-to-face.

## I. Card Sorting & Link Labeling – A Short History

A large quantity of research and case studies exist about card sorting for informing the design of websites' information architecture (Faiks and Hyland, 2000; Martin, 1999; Maurer and Warfel, 2004; Robertson, 2002 ). Initially, card sorting, a user-centered design methodology, was conducted as face-to-face, one-on-one exercises between a facilitator and a participant from a website's target audience (Nielsen, 1993). These exercises produced results that helped information architects and designers understand users' expectation for organizational patterns of information. Card sorts were eventually adapted to online interfaces, which accommodated more participants in shorter timeframes (Bussolon, Del Missier and Russi, 2006; Dong, Martin and Waldo, 2004; Wood, Wood and Anderson, 2002).

Additionally, card sorting was paired with a labeling exercise (Wood, Wood and Anderson, 2002), where participants are presented a description of content for a webpage and assign a name to the content to describe or summarize it. Information architects and designers use the feedback from the labeling exercise to inform link names and terminology used throughout a website. Understanding how users conceptualize or label types of information is especially important when the content relies on users' understanding of specialized or technical concepts. However, in the transition to an electronic medium, the labeling component was mostly abandoned. Information designers settled for understanding how users would organize information, without seeking feedback on how users label and conceptualize that information.

## II. Writing for the Web

Effective information design and technical communication rely on using words that the target audience understands. If communicators use ambiguous or confusing words, their message will get lost or misconstrued by their audience. Marnell (2009) argues that writing clearly and in the intended audiences' words and syntax has lost its importance for information designers, technical communicators and other writing professionals. Moreover, Marnell makes the mandate that writers and information designers need to be immersed in their audiences' language to effectively communicate.

In *writing for the web* texts, links are often described as providing an information scent to the user (Reddish, 2004; Tullis, 2005). Links that are descriptive and written in users' syntactical language provide an information scent that leads users to the information they are seeking. Conversely, information that is hidden behind poorly constructed links has a weak scent, which users do not pick up and do not access the information they want.

Link naming for websites is frequently mentioned in articles about design best practices. Tullis (2005) lists awkward or confusing navigation and unclear link names in the top ten mistakes made in communicating web-based information. Navigation that is confusing includes organizing information in ways that users do not understand or expect. Confusing navigation and link names may also be designed with terminology users do not understand or interpret as being related to the content presented. For example, a website that contains link names and organization based on internal or administrative jargon would be confusing to users coming to the website for the first

time seeking information about the organization. Users who encounter obscure or esoteric links may infer that the information on the website is not intended for them.

In their guidelines for web navigation, Farkas and Farkas (2000) also include making sure that links identify the information to which they lead. The solutions they propose include using text links that describe its destination, but also situate the link in a context from which users can infer additional attributes. An informational website for a college is going to include information about admission requirements. A link called “admission requirements” better describes the content than “requirements.” It may also be more appropriate for the audience than naming a link “gettin’ into our school.” Additionally, the context of where on the website the links are located affects how easily users understand link targets. An “admission requirement” link has different meaning on a webpage about a graduate school program than on a webpage about an undergraduate program. Determining how intended audiences conceptualize information and what language is appropriate will lead to a more usable website.

Farkas and Farkas also posit that using graphic links, especially common icons, help users process and understand information easier than text. As with text links, graphic links can include additional context through alt tags, helping users understand the purpose and destination of a link. Finally, they also claim creating an information hierarchy that users understand and expect will assist users in clicking links appropriate for the information they seek. Farkas and Farkas provide instructions and heuristics for writing link labels, but are not concerned with user-centered approaches like card sorting for understanding link labels or terminology.

Spyridakis (2000) says that web designers should create links with words that users easily understand and know where they lead within or external to the website. Spyridakis, in contrast with Farkas and Farkas, says that links should be written in a way that users do not need to rely on the surrounding text to understand the links destination. When creating link names, ignoring the context makes the task more challenging for information designers and architects. Although, while ignoring the context designers and architects would have to create more descriptive link names. Of course the more descriptive a link, the better users will understand its target. However, using the context is a method of describing the target without using too many text characters, which can also distract users from finding what they want.

Moreover, Spyridakis vaguely describes usability testing as a method for determining if vocabulary is appropriate for a website's audience. While testing existing terminology and link labels through usability evaluations is an appropriate step to validate what resonates with users and to find out what terminology is confusing, information designers and information architects should try to understand their users' vocabulary before their design has taken shape. By learning what terminology and link labels users expect and relate to, designers can create information scents that lead users to the information they want. Farkas and Farkas's assertion that understanding the target audiences' expected information hierarchy leads to users clicking the appropriate links is a reason that information architects should conduct card sort inquiries. However, card sorting's primary objective is to determine users' expected organization of information. The labeling activity that once accompanied card sorting is a better method for understanding user vocabulary.

### III. Research Questions -- How to Administer the Link Labeling Exercise?

Since the disjoining of card sorts from the labeling activity where users assign a name to a description of intended website content, designers and architects have relied on best practices and heuristics for naming links. Using card sorting and the labeling exercise in the pre-design stage, designers would better understand their audience's language and conceptualization of terminology. However, since card sorts have expanded from being administered in a face-to-face setting to a web-based interface, exploring how to conduct the labeling exercise is necessary to properly ground the methodology.

The primary goal of this project is to determine which method leads to better feedback on labels and/or link names for technical or knowledge specific information. By comparing face-to-face and web-based administering of the same labeling activity, I expect to answer how each method provides utility and useful information regarding content labeling.

### IV. Research Method

To compare face-to-face and web-based administering of the labeling activity, I collaborated with the College of Education and Human Development web design team. The web design team is part of an administrative unit in the college at the University of Minnesota and they were in the beginning stages of redesigning the College of Education and Human Development website. The team wrote 34 content descriptions representing information that they planned for discrete web pages. These descriptions were presented to the participants to label with link names they would expect to lead to

the information. The team also labeled each description with the link name that they thought was most appropriate for the content. This step was taken so that the participants' labels could be compared to the team's expectations and so the team would have an easy way to refer to a description. The participants were not shown the team's label. Chart 1, below, lists the descriptions that were presented to all participants as well as the label the team assigned to the description, which was not shown to the participants.

Chart 1 -- List of description given to each participant

<b>Term Name Proposed by the CEHD Team</b>	<b>Description of Web Page Content</b>
Additional licensure	List of additional teacher licensure programs. How to apply to a program leading to an additional teacher license.
Advisers	List of College of Education and Human Development advisers by subject area. Includes phone number, email address and office location.
Alumni events	How to participate in college events after graduating. Calendar of events including Saturday Scholars, job fairs and reunions.
Alumni mentors	Opportunities for alumni to mentor current students. Description of the alumni mentorship program
Capstone projects	Description of student capstone project requirements. Showcase of past projects.
Career paths	Types of careers for College of Education and Human Development students listed by area of study.
Class scheduling tips	How to take classes between the St. Paul and Minneapolis campuses. Information about scheduling and transportation between campuses.
Declaring a major	Steps for declaring a major. When to declare a major.
Faculty research	Highlights of current faculty research. Interviews with faculty about research.
Fellowships	How to find fellowships and assistantships for graduate students

<b>Term Name Proposed by the CEHD Team</b>	<b>Description of Web Page Content</b>
Finances	Estimated tuition, housing, books, fees and cost of living expenses for undergraduate students.
Find jobs	Resources to assist finding a job while a student and after graduating. Career Counseling information.
Future international students	Application and enrollment process for international students. Paperwork and visa requirements for prospective international students.
Grad requirements	Test scores and other requirements for entrance to a graduate program.
Graduate admission	How to apply for graduate admission. Deadlines and requirements.
Graduation	Directions for applying to graduation and participating in graduation ceremonies.
Information sessions	Informational events for prospective students. Lists the dates and times. Includes registration forms.
Internships	Search and apply for internships
M.Ed. Certificates	What certificates you can earn while working toward an M.Ed.
Mentorship opportunities	Mentorship program for current students. How to get an alumni mentor. Benefits of having a mentor.
Multicultural programs	Resources for multicultural, non-native English speaking and first generation college students. Classes and support to assist students earning a degree or transitioning to college.
Orientation	List of new student orientation dates. Registration forms. What to expect at an orientation.
Registration	How to find and register for classes. Description of University registration system and terminology.
Scholarship giving	How to select and donate to a scholarship. Or create your own scholarship fund.
Scholarships	List of College of Education and Human Development scholarships. Links to department and University scholarships.
Term Name Proposed	List of student groups relevant to College of Education and Human

<b>Term Name Proposed by the CEHD Team</b>	<b>Description of Web Page Content</b>
by the CEHD Team	Development undergraduate and graduate students. These groups may be within CEHD or external to it.
Student groups	Blogs and videos by current students to demonstrate student life
Student voices	Study abroad opportunities for College of Education and Human Development students broken down by area of study.
Study abroad	Entrance requirements for undergraduate teacher programs -- GPA and standardized test scores.
Teacher requirements	What type of degree you need to teach a particular subject area and what else is required.
Teaching degrees	State of Minnesota and academic requirements to become a K-12 teacher.
Teaching requirements	How to access online courses. What computer labs and other technology are available to students.
Technology resources	How to transfer credits from a Minnesota community college. List of courses that prepare students for College of Education and Human Development programs listed by community college.
Transfer guide	Course requirements for undergraduate degrees offered by the College of Education and Human Development. Overview of what undergraduate majors are offered.

The team identified the website's target audience categories who would serve as the study's participants as:

- Undergraduate students in the college
- Graduate students in the college
- Prospective undergraduate students who have expressed interest in the college
- Prospective graduate students who have expressed interest in the college

- College Alumni

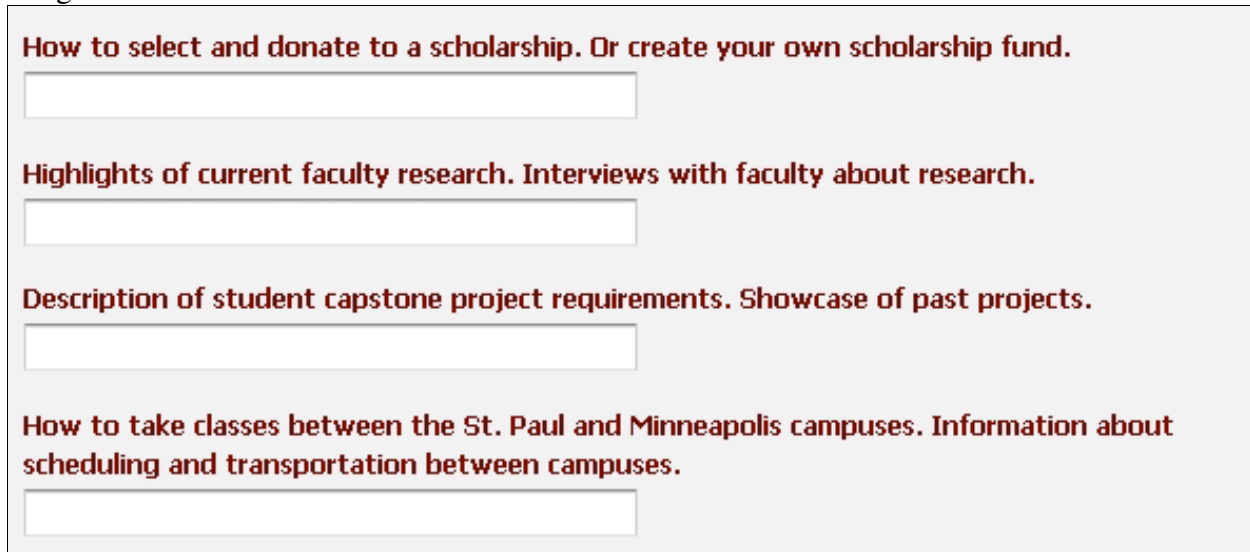
Of the undergraduate and graduate students, international students (i.e. not from the United States) and non-native English speakers were represented in face-to-face and web-based samples because the web design team was particularly interested in representing the diverse demographics of the College of Education and Human Development. Participants from the target audiences were recruited via email. The web design team provided names and email addresses of people who fall into their target audience categories.

For the face-to-face portion of the study, each description was printed on an index card and participants from the target audience were instructed to write the link name they would expect to lead to content described below the description. After the participants labeled each description, they completed an open card sort, sorting the cards into categories that they think they belong. After the cards were sorted, the participants named the categories the cards had been sorted into. The card sort results were not used in this study, but were used by the design team to begin building the website's information architecture.

For the web-based portion of the study, users from the website's target audience were recruited to complete the same labeling activity through a web interface. The web-based portion of the project is a collaborative effort with WebSort ([websort.net](http://websort.net)) an online card sorting application. Using a web form, participants labeled the same descriptions presented in the face-to-face study. A description of content was presented above a text box in which participants entered the link they would expect to lead to the

content. The web-based participants did not complete an open card sort. Image 1, below, shows the WebSort interface for the labeling activity.

Image 1 – Screenshot of the web interface



**How to select and donate to a scholarship. Or create your own scholarship fund.**

**Highlights of current faculty research. Interviews with faculty about research.**

**Description of student capstone project requirements. Showcase of past projects.**

**How to take classes between the St. Paul and Minneapolis campuses. Information about scheduling and transportation between campuses.**

A description of webpage content is presented with a blank text field below. Participants will type the label in the text field to describe the content.

No precedent has been set regarding how many participants to test in a labeling exercise. Because of the labeling exercise's close relationship to card sorting and because the descriptions were intended to be used in a card sort, I tested a number of participants that would reasonably validate the categories created in a card sort. Based on results of a large card sort study, Tullis and Wood (2004) recommend testing 20-30 users in a card sort study. Analyzing the same data as Tullis and Wood, Nielsen (2004) recommends testing 15 users, which leads to a correlation of 0.90 for the results. Comparatively, 20 users should lead to a 0.93 correlation and 30 a 0.95. Nielsen argues that for practical information architecture purposes that a 0.90 is a good return on investment. While the goal of this research is to provide more than practical information, no similar studies have determined the appropriate number of participants to include. Rather, a thorough analysis of the labeling results will indicate if 15 face-to-face

participants are sufficient. If the analysis of the labels shows any discernable trends, then at the least 15 participants was a practical number of potential website users to test; the web design team will be able to use the elicited feedback to inform their link naming and terminology choices.

While the face-to-face portion of the study can cap a maximum number of participants, a limitation of the web portion is that the web interface does not close the study when a set number of participants have completed the exercise. To not be overloaded with responses, staggered sets of users were recruited. The goal was to have sixty completed web-based labeling exercises.

After the face-to-face participants completed the labeling and sorting the descriptions, their labels were compiled in a spreadsheet. Each description was listed with the labels participants assigned to it. This allowed for a content analysis of the labels to be performed. Additionally, participants' card sort results were entered into a database. This information recorded what descriptions were grouped together and the category names assigned. The card sort results (not the labeling exercise) from the face-to-face portion of the project will be replicated in WebSort's a web-based card sort application. This step will eventually (aside from this study) be used to compare card sorting descriptions to terminology created from the results of the labeling exercise. For the web-based labeling component, WebSort ordered the responses into a spreadsheet showing what label each participant gave the associated description of content. The spreadsheet that WebSort generated was similar to the spreadsheet created manually from the face-to-face portion of the study.

The spreadsheets from each portion of the study were compared to see if any differences in labeling exist between the two studies. The results from the study were turned over to the web design team who will make the final decisions regarding how to label the links for the redesigned website. Feedback from the team was solicited to evaluate the quality and usefulness of the results from each version of the activity. The team was sent a six-item questionnaire to complete after the results from each portion the study had been delivered to them. The six questions were:

- 1) What do you think of the results from the face-to-face terminology review?
- 2) What do you think of the results from the web-based terminology review?
- 3) How did/can you use the results from the face-to-face terminology review?
- 4) How did/can you use the results from the web-based terminology review?
- 5) What differences did you observe between the face-to-face and web-based terminology review results?
- 6) Which results do you think are more useful? Why?

## V. Results

The results of the study are comprised from three sources: 1) results from the face-to-face labeling exercise, 2) results from the web-based labeling exercise and 3) the web design team's use of and comments about the two components.

15 potential users from the website's target audience completed the face-to-face labeling activity. In general, the users offered similar labels for most of the terminology. 20 of the 34 terms were given similar or the same labels by at least a majority of the users. Likewise, many of the user-generated labels were similar to the team-proposed

labels, with the users' labels containing at least one similar word or form of a word. Additionally, of the 14 terms that were not labeled similarly by a majority of the participants, nine of those terms were named in ways that implied preferred labels. Those nine terms, across the participants, were labeled with two distinct themes or trends in naming conventions. While the labels were not created by a majority of the participants, this shows that participants thought of these descriptions in at least two concrete ways.

As for the online portion of the study, 38 potential users, of the 2706 recruited, completed the web-based labeling activity for a 1.4% response rate. Like the face-to-face activity, the web-based activity produced similar results. 25 of the 34 were labeled similarly or the same by at least a majority of the participants. Like the face-to-face exercise, the nine descriptions that were not labeled the same by a majority of participants were labeled in ways that showed preferred words or concepts for the user base. For the most part, web-based participants created labels that were close to the labels created by other users, but did not have the same continuity as the face-to-face responses. The web-based labels showed more variability in the participants' preferences for how to label the terminology.

Another prime difference that emerged between the face-to-face and web-based data was that web respondents were more likely to provide longer labels as well as labels that seemed more abstract than their counterparts. Also, some web-based respondents indicated that they did not think that some content belonged on the College of Education and Human Development website, while no face-to-face respondents mentioned their dislike of any potential content.

Results from both methods showed that participants would often use language from the description in their labels. Participants would hone in on key concepts in a description and either reproduced it verbatim or use similar forms of the words in their labels. Participants labeled every description in this manner with some descriptions being treated in this manner more than others.

The four-person design team was asked for their feedback about both phases of the study. Of the four team members only one person returned a completed feedback questionnaire, but her responses were worded in a way that implied she was speaking for the entire team or had discussed the information with her colleagues. Most importantly, the responses in the questionnaire indicated that the results from the face-to-face and web-based methodologies were equally useful, but in some different ways. The face-to-face results allowed the team to understand the best ways to name their website's navigation. Because the face-to-face results were from a smaller sample, the team thought that the information was easier to sort through and make sense of the trends. The team indicated that they used the results from the web-based study to reinforce their navigation-naming decisions from the face-to-face study. Additionally, the feedback from the team indicated that the web-based results were used to inform other webpage elements like content, headers and page titles. Because the labels from the web-based study were longer and seen as more creative by the team, these results were regarded by the design team as more suited for influencing webpage elements beyond link names.

## VI. Discussion

In both exercises, participants often wrote labels that contained the same or similar words and phrases found in the corresponding description. This phenomenon is similar to the bias in card sorting that emerged when Nielsen (2009) observed that participants categorized based on the language used to describe the items to sort. Nielsen said that during card sorting, participants would group cards and label categories with language similar to that printed on the cards. He recommends avoiding this type of bias by presenting participants with cards that have the same information written in different ways by using synonyms and non-parallel structures across sets of cards. For example, in a card sort study of 12 participants, half of them may see cards worded one way, while the other half would be presented the same information using different words to convey the same meaning. Descriptions could have been written following Nielsen's recommendations. This would have shown where participants were confused by a description. If a description written one way and the same content described in synonymous language were labeled with mimicking words across the participants, this would possibly show that description was not clear or that users do not have any particular parlance for conceptualizing that content.

While both sets of labels included responses that seemed to be summaries of the descriptions, the web-based labels displayed greater variety in vocabulary, overall construction and were more useful for understanding user preferences in possible link names for the planned content. More diversity in responses gave the web design team better context and label choices for constructing the website's links and content labels. Some of the web-based responses were long, rambling narratives that would never be

used for links on a website. However, the lengthier labels provided more insight into participants' vocabulary and attitudes about the information. In feedback from the web design team, they said that both versions of the exercise were useful, but that the web-based provided labels that they would not have considered. They repeatedly said that the web-based exercise elicited creative feedback that was not present in the face-to-face exercise. While the web-based exercise, like the face-to-face, did include labels that repeated some of the descriptions, the "more creative" responses suggests that the web interface or lack of a moderator may limit some of the bias.

Moderator bias was a potential significant factor that could have contributed to the face-to-face participants mimicking the descriptions in their labels. During the face-to-face exercises, participants often asked questions of and looked for approval from the moderator. They wanted to make sure that they were completing the process the way they were instructed. While the moderator can take actions to eliminate bias, one cannot predict how a participant is going to respond to instructions or answers to questions. For example, after labeling the first card or two, many participants asked if what they were doing was correct. While at the time, a response like "yes" or "continue what you are doing" may seem unbiased to the moderator, a participant may interpret those responses to mean that they should continue to use keywords from the description in their labeling conventions. Because the web-based participants did not have the option to ask clarifying questions about the procedure, this particular bias was mitigated.

The web design team also said that the more creative and longer responses in the web-based results helped them create other webpage elements like headings, page

titles and even page content. Conversely, the team reported that the face-to-face responses were only used to create or confirm possible link names. The web-based exercise, without the potential of moderator bias, seems to have helped participants feel less inhibited about providing authentic feedback instead of labeling the content in ways they thought how the design team wanted them to react to the descriptions.

However, other types of biases could have affected the web-based exercise, such as participants self-editing their initial reactions to descriptions in favor of labels that they thought were more creative or for what they thought the design team was looking for. In the pilot study of the web-based interface, I observed participants lingering over descriptions trying to craft the perfect labels. This observation was accounted for in the web-based exercise's instruction, telling the participants that the design team wanted their initial reaction to a description. While participants were instructed to use the first label that came to mind, this does not guarantee participants approached the process in this manner. One of the benefits of the face-to-face method is that a moderator can help dictate the pace at which participants create labels. By having participants label descriptions at a quick speed, a moderator can improve the usefulness of the labels because participants will be more likely to use their first impressions in the terminology they assign to the description.

Additionally, Participants may have begun the exercise and then quit before they completed all the labels because they were not confident that they were doing the activity correctly. Participants may have self-selected out of the exercise because they thought they were completing the activity incorrectly, but in fact were providing useful feedback. Knowing how many people began the web-based exercise and then decided

to opt out would be a useful statistic to have tracked even though it would not explain why they did not complete the exercise. Because of the similarity to the face-to-face protocol, knowing if users abandoned the interface would help point to possible confusion in the instructions.

One more source of bias could have come from participants concurrently viewing or recently visiting the current College of Education and Human Development website. Participants could have just looked at the college website to find information they needed or participants may have looked at the website to *help* them with the labeling activity. Whatever the reasons may have been the information they took in could have influenced their feedback or reactions to proposed content. I do not know if any of the online participants were influenced by or actively sought out *help* in labeling information. However, the process did safeguard against blatant attempts to use current website information. Participants were not told what website was being redesigned only that they fit the target audience. Participants could have guessed the exact purpose of the project, but that possibility seems unlikely and even more unlikely that participants would try to use the current website to inform their labeling conventions.

Another related problem that could have crept into the web-based study stems for the protocol not guaranteeing that a participant could not complete the exercise more than once. While the web application tracked the participants by IP address, so that duplicate IP addresses could be excluded, this did not guarantee participants would not login in from a different location, potentially changing their IP addresses. To reinforce this, participants also had to enter their name and contact information to be entered into the drawing, which was used to entice participants. The data showed that

one name was submitted for every set of answers. No one completed the activity anonymously, so duplicate participation seems unlikely (unless someone completed the activity under a pseudonym).

One of the surprising outcomes from the web-based exercise was the low response rate. A 1.4% response rate seems very low when compared to how easily recruiting 15 participants for the face-to-face exercise was. Recruiting the 15 face-to-face participants required 1977 recruiting emails, resulting in 90 possible participants to schedule. That is a response rate of 4.6%, significantly greater than the web-based exercise's response rate.

I can only guess at what the reasons for the disparity may be. While a cash honorarium was offered for participating in the face-to-face exercise, the incentive for participating online was being entered into a drawing for a gift card (worth more than the cash offered in the face-to-face project). Perhaps, the web interface did not appear to be credible to a University of Minnesota target audience that is accustomed to seeing URLs from the University. Even though the University word mark was displayed in the web interface, this may not have been enough to satisfy user skepticism. Luckily, the potential audience for the College of Education and Human Development website is large enough to lead to sufficient, practical feedback through the web interface. Had the possible response rate been known beforehand, more users would have been solicited for feedback rather than inviting smaller batches to complete the exercise.

In the end, the amount of time necessary to complete the face-to-face and web-based projects was comparable. The web-based exercise took significantly less time and work to prepare, administer and order results in a meaningful way. But finding

participants took longer and was more challenging than the face-to-face exercise's process. Based only on effort and time, the web-based labeling exercise would allow web designers to elicit feedback on content faster than the face-to-face method if they were able to anticipate the proper response rate.

The results and feedback from the team has shown that the web-based labeling exercise is as useful, if not more efficient (and useful), than the traditional face-to-face method. However, a next step in improving the labeling exercise is to investigate how Nielsen's suggestions of using synonyms and non-parallel structures in the descriptions changes the nature of the labels created. Instead of presenting each participant with the same descriptions, use synonyms and non-parallel structures across the participants to compare the quality of the feedback elicited in the form of labels. Another option, that would take significant more time and effort to create, is to present the participants with a mocked up webpage representing a piece of content and have them label that instead of a short, text based description.

Finally, the labeling exercise should be integrated back into the card sorting process. By first determining if the labeling exercise and card sorts should be conducted in conjunction with one another or if the labeling exercise should be used to inform the names of the items being sorted, the card sorting and labeling activity processes will be optimally beneficial to web designers. To do this, one should compare the qualitative differences and perceived utility of card sorting studies that include a labeling exercise performed at the same participant session to a study where the labeling exercise is used to create the terminology for the card sorting study. In the latter, the labeling exercise would be performed, analyzed and applied before the card sort is conducted.

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