How Do You Compare?: Using content analysis to assess student learning

Zoe Jarocki
San Diego State University

Abstract: Assessment is a critical step instruction. Free response assessment questions provide unstructured insight into student's understanding. However, it can be difficult to draw generalized conclusions from these sorts of responses. This presentation will share the methodology and results of a project in which we used content analysis to quantify and compare student responses to a post-library tour assessment. We created a taxonomy and applied the codes to the student responses in order to perform a content analysis. Once the answers were coded, we were able to compare the number of codes applied by each mode and what see what types of spaces, services and collections were mentioned. We concluded that the mobile tour was an acceptable replacement for the librarian lead tour.

Keywords: Content analysis, Instruction, Academic Libraries, Mobile Technology

1. Introduction

Assessment is a critical step in instruction. It checks student's comprehension and understanding of the material, but perhaps more importantly, allows the instructor to determine if the mode and approach of their teaching is accomplishing what they set out to do. An organized assessment plan also gives insight into the effect of changes to services, instructional approaches and modalities. When librarians use the results to improve their teaching, assessment closes the design loop and allows for continual improvement. Free response assessment questions provide unstructured insight into student understands. However, it can be difficult to draw generalized conclusions from these sorts of responses.

This paper will share the methodology and results of a project done at San Diego State University Library, a large, research-intensive public University in southern California, in which we used content analysis to quantify and compare student responses to a post-library tour assessment. The goal was to determine what students were learning and to compare the responses across two modalities

Received: 31.7.2017 Accepted: 21.11.2017 ISSN 2241-1925

of library tours. We created a self-guided library tour that students completed using their cell phone or tablet which replaced the traditional librarian-led face-to-face tour that we had given previously. After each mode of tour, students completed a short assessment and were asked the report the top three things they learned. We created a code taxonomy and applied the codes to the student responses in order to perform a content analysis. Once the answers were coded, we were able to compare the number of codes applied by each mode and what see what types of spaces, services and collections were mentioned. Assessing the instruction outcomes by using content analysis also gives us a baseline to compare future innovations. We determined, based on the responses from students that the face to face and mobile tour outcomes were very similar, and therefore, we concluded that the mobile tour was a valid replacement. We will also use these findings as a way to gauge the impact of future changes. For example, we are currently working on videos to add to each stop of the tour and now we have benchmarks that allow us to compare any changes.

This paper will provide some background into assessing student learning and content analysis methodology. It will then describe the background, origins, and outcomes of the tour project and the methodology used in assessing it. In conclusion, this paper will explain findings on the efficacy of the mobile tour.

2. Background

Pressure to conduct assessments, both of student learning and of programs and services, have increased in recent years. Gratch-Lindauer note the mounting pressure from campus administration and accrediting agencies to show evidence of student learning (2003). At the same time, deliberate and reflective design of instruction and assessment methods can help librarians improve their teaching and increase student learning. Assessment should not just happen for assessment's sake. It should be conducted as part of a cycle of continuous improvement. Grassian and Kaplowitz describe how assessing student learning allows instructors to evaluate the results and then revise their approach if necessary (2001). Findings from assessment of student learning can also be used to "tell the story" of the library in a way that resonates with other groups on campus, academic departments and administrators.

Content analysis is a research method that can be used to draw conclusions from wide variety of quantitative data sources, such as books, scholarly or newspaper articles, tweets, interview transcripts, focus groups and more. In a foundational text that describes the methodology, Krippendorf defines content analysis as "a research technique for making replicable and valid inferences from texts (or other meaning matter) to the contexts of their use"(2004). There are different approaches and applications of content analysis. Classification analysis looks at documents as a whole and seeks to understand the purpose and context. Elemental analysis looks for meanings within texts by analyzing word or thematic frequencies (Radcliff, 2007). Content analysis can also study relationships between concepts and themes that appear in the textual data.

(Wilson, 2016) This methodology, though somewhat labor intensive, is well used in the Library and Information research literature. Examples of studies where a content analysis was performed include analysis of job descriptions, reference interview transcripts, message boards and library literature (White, 2006).

San Diego State University (SDSU) is a public research university and part of the California State University system. It is an urban campus with a total of 34,254 students (as of Fall 2015) and an undergraduate population of 29,234. According to US News and World Report's calculations and reported in the University NewsCenter, SDSU in in the top 7 most diverse universities in the country (2016). SDSU is a designated Hispanic Serving Institution, with 31.1% of under undergraduate students identifying as Latino/a. The campus has one library that serves undergraduates, graduates and faculty with 3.7 million visits a year.

Although most students live off campus, 62% of the 4,141 freshmen entering first year students in 2014 lived in on-campus dorms. Many of these students take a one unit General Studies 100 level University Seminar class that aims to teach them "study and interpersonal skills for academic and personal success." Some of these sections have a subject or student population focus, for example there is a section for athletes and a section for pre-law students. In the Fall of 2014 there were 63 sections offered of General Studies 100.

3. Tour Project Description

The library has a strong relationship with the General Studies (GEN S) 100 program and a tour has been integrated into the course since 2009. For many years, librarians and library staff lead these tours as scheduled guided sessions lasting approximately 30 minutes. The emphasis of these tours was on the library spaces and services offered. In Fall of 2013, the last year the library offered guided tours, librarians and library staff lead 27 class-based groups through the library. The sections of the course are capped at 25, so it often took two library staff to lead the tour for one section. A script was provided to the tour guides that took the groups to the same areas of the library, and prompted the guide to present the same information.

Although largely successful, there were issues with the guided tour model. As all tours were scheduled over the course of two weeks, it was often difficult to find tour guides for all sections of the course. As the seminars themselves were scheduled for the same time block there could be up to three tours being undertaken in the library at the same time, leading to crowding and the need for multiple starting points. The students were often not very engaged as the tours occurred early in their first semester before students needed many library services. Sometimes the course instructors also did not attend, or accompanied one half of their section, which did not help the librarians keep the attention of the students. Students were given a short assignment to complete after the tour

to turn in for credit where they were asked to name three things they learned about the library.

In order to address some of the issues with the guided tour, we decided to create a self-guided tour students could take using their mobile devices that would take them through the same library spaces and teach them about library services as the guided tour. The theme of the mobile tour was "Library of the past, library of the future" and we included vintage photos from the archives. After the tour, we decided to have students complete the same assignment as the guided tour for submission to their instructors for course credit. The goals of the mobile tour were to require less staff time, increase student engagement and give us an opportunity to add interactive content. We did a soft launch of the tour in spring semester 2014 and fully launch the tour as a replacement to the face to face tour in the Fall of the same year.

When planning the mobile tour we decided to create a simple web page corresponding to stop on the tour. The long term plan includes creating a video for each area, but initially these sites were simple responsive web pages created using PHP with a MySQL database to track progress and log student progress. There were nine tour stops with corresponding posters and web pages. The websites contained highlights of the features, collections and services students might find in each area. The tour was set up so that the student, using their own smartphone, or a library supplied Nexus 7 tablet could follow the tour stops and receive the same information included in the script used by the tour guides. Each poster contained a QR Code, NFC tag and a short URL, each leading to the tour website. QR Codes, or Quick Response Codes, are universally accessible via smart phones using a QR Code reading app. The NFC, or near field communication, tags used were small stickers that broadcast a low power Bluetooth signal, and can be read by most modern Android devices.

The tour was designed so that it could be used by the casual visitor to get more information about the area in which they were in, and also for visitors taking the structured multi-stop tour for course credit. Upon completion of all tour stops visitors on the tour were offered a short assignment based on a paper assignment given to students the year before and were prompted to email themselves a tour receipt. This tour receipt contained their assignment answers and could be printed out, or forwarded to their instructor. The receipt contained a link to an online badge indicating the visitor's name and the date they completed the tour. The badge was a simple URL containing the Unique ID of the student, which was used to display their name from the tour database along with a statement that they had completed the tour.

4. Methods and Results

The assignment at the end of both modalities asked students an open-ended question about three things they learned about the library while on the tour. We chose to ask an open ended question in order to capture authentic student

responses to the tour, in their own words. In order to compare these qualitative responses, we performed a content analysis in order to standardize the results and allow us to draw generalized conclusions. We developed a taxonomy based on the three dimensions of the LibQual library effectiveness surveys; Effect of Service, Information Control, and Library as Place (Green & Kyrillidou, 2011). An extensive list of keywords associated with library spaces and services was developed and mapped to the broad headings Library Spaces (Library as Place), Library Services (Information Control/ Effect of Service), Technology/ Equipment (Information control), along with headings for Collections, Library Facts/Trivia and Other. The Other category was used as a catch all to make note of incorrect responses, or confusion on the part of respondents. The cloud-based Dedoose software was used to code the short assignments with the preferred terms. The assignments and coding taxonomy were uploaded through the Dedoose website and the three librarians involved in the coding process met to discuss the process and how the codes would be applied. The working group coded fifty assignments together to ensure we agreed on the interpretation of the codes, and to determine where we might have difficulty applying codes. The group also met frequently to talk about how a response might be interpreted. We chose not to do extensive inter rater reliability testing as, for the most part, the application of codes was straightforward in that the student short responses fit within the taxonomy of services, collections and space. The main coding issue surrounded agreeing on how to handle negative, incorrect and facetious responses. Once the coding was done the coding terms could be examined and analyzed separately from the original student assignments.

A total of 586 students took the mobile tour using their own cell phones or the library Nexus 7 tablets during the Fall 2014 semester. Of the devices used for the tour 406 were personal iPhones or iPads using the Apple iOS operating system, 74 were phones that used the Google Android operating system, 81 were the library Nexus 7 tablets, and 7 devices were identified as devices using the Windows OS. The most common access method was the QR code with 433 accesses, next was NFC tags with 71 visits, most from the library tablets which had instructions for using the tags, and the rest, 64, were URL entries. The average time taken on the tour was 16 minutes and 30 seconds.

For the librarian lead tour, the paper assignments were submitted to the instructor for credit and 179 were voluntarily returned to the library working group for analysis. As the library collected the self-guided tour responses directly we had access to the 568 self-guided assignments completed during the Fall 2014. The guided tour written responses were slightly longer, students on average used 36 words to describe what they learned about the library. The students who took the self-guided tour using their mobile device used an average of 23 words, which may be explained by the effort required to type on a cell phone or tablet screen. However, the responses from the students on the self-guided tour were more varied in their content- 84 codes were applied to their responses in contrast to 73 codes used for the guided tour. The mean

number of codes applied to each tour was very similar. A mean of 7.3 codes were applied to the guided tour as opposed to 6.6 for the self-guided tour. The median and mode of codes applied were 7 for both formats.

The student learning objectives for the face to face and the self-guided tour were the same. After the tour we wanted them to be able to navigate the library, locate collections, understand library services and know where to get further help from librarians and staff. As previously mentioned, the assessment tool was a single open ended question about what they learned on the tour. In order to determine if the learning objectives were met, we used the coded results and the code tree to look at both broad categories and specific mentions of spaces, services and collections.

The first learning objective was to get students to feel comfortable navigating the library. One of the benefits to the self-guided tour is that by the very act of doing it, students learn to navigate the space by themselves. The connection to this outcome was less self-evident with the guided tour, since students had a guide to follow and did not have to find their own way around the building. Library spaces made a big impact on students in both tour modalities. Over 90% of students taking both tour mentioned the "library as place." The 24/7 study area was mentioned by half of both types of tour modes. This might be high for the self-guided tour as it was the last stop on the tour. However, there are a number of other explanations for why it was so high across both modes.

The 24/7 space is a well-used and important service for students, so much so that the late night hours are supported by a student use fee approved by the student body in 2008. However, the library's archives and special collection were not mentioned as much, even though the last stop on the tour in the 24/7 area had a poster talking about the collections and services and was near a case that displays items from the archives. The study rooms were mentioned more in the guided tour than the self-guided tour. This could be due to extra emphasis by the tour guides who may have showcased the rooms throughout the building and not just in the last stop of the self-guided tour in the 24/7 area. There were a few codes that had a big difference in application between the guided and self-guided tours. This included the study rooms, but also the food friendly areas, the quiet study areas, the Media Center and general layout and size comments. We propose that this difference is mostly due to a natural variation of responses as well as differences in what the tour-guides emphasized on their tours. Although there was a script available, the tour guides used it as a guideline rather than reading directly from it.

After completing the tour in either modality, we wanted students to be able to identify and locate library collections. The top level code on the code-tree for collections is "information control." The results were similar, but the code was applied more by the students that took the self-guided tour. Students that took the self-guided tour replied to the assessment question with an answer that we

coded as information control 52% of the time, while only 40% of responses from the guided tour mentioned information control. The library's book collection was also mentioned more in the self-guided tour. This might be because the number of books owned by the library is listed as a fact on the tour websites, and those facts on the whole ended up showed up in the coding more often. Periodicals on the other hand were mentioned more by students on the guided tour. The library's DVD collection was mentioned in both modes, however more often in the self-guided version. Computer hardware collections like Nooks and laptops (we called this realia in our codes) were mentioned more in the self-guided tour. Ebooks were not mentioned much by students on either type of tour, perhaps because it is difficult to show online collections and content in a tour that is based so physically in the library.

Not many students mentioned services after completing the tour in either modes. Only 22% of students taking the mobile tour and 24% of students in a guided tour mentioned library services. There were low rates of responses that mentioned computer help and course reserves. Computer equipment and printing services were mentioned roughly equally by students in both types of tour. Collaborative equipment, like shared screens in study rooms, were mentioned more often in face to face tours. The library's scanning equipment, including a "Book-eye" scanner, was mentioned more often after the face to face tours. Although the scanners are mentioned in the mobile tour, they are not shown and the tour does not pass by any, which may explain their lack of mention.

The student learning outcomes that were more about information literacy goals were more difficult to observe from the unstructured responses. We were interested to see if students could identify where to get help with their research. Librarians, virtual reference services and the research help desk all received low rates of mentions. The desk was only mentioned in 5% of the self-guided responses and 2% of the face to face tours. It is also difficult to judge what students learned about research skills and information literacy concepts, such as differentiating between different formats of information. Student did not see information literacy skills and where to get help as the top take-aways of the tour in either modality.

5. Conclusions

In comparing the two tour formats we believe students received a very similar experience regardless of whether they had a guided or self-guided tour. We applied an almost identical number of codes to each student response, with the coding for the self-guided tour covering slightly more topics, suggesting that the self-guided tour met the same learning objectives as the guided tour. Even though students, as might be expected, wrote less when responding on their phones, the quality of the responses, based on codes applied, did not suffer. We also found that students tend to report what they see, while a tour in either format is a great way to introduce students to spaces, students tended to skip

over collections, especially online, and services in both formats of the tour. As expected students who spent less time on the self-guided tour reported more rudimentary information, such as information about library hours. When students spent longer on the self-guided tour they began to talk about more in depth information, such as library policies, and less about the ambiance of the library. However, when students spent longer than 30 minutes on the self-guided tour they became more critical of the tour itself, suggesting a tour designed to last less than 30 minutes may be desirable. It was also interesting that there were more incorrect submissions in the guided tour, but more facetious answers in the self-guided tour. Based on the finding, we have concluded that the mobile tour is an acceptable replacement to the face to face tour.

Now we have established a baseline with which to compare any new innovations. We are currently working on a series of short videos to post at each tour location and we will be able to compare how the format of the content effects learning outcomes. This is how we close the design loop and ensure that we are teaching students in an effective manner.

Many thanks to my colleagues, Carolyn Baber and Keven Jeffery, who collaborated with me on this project. Portions of this paper appear in a paper in progress.

References

Grassian, E. S & Kaplowitz, J. R., (2001). *Information Literacy Instruction: Theory and Practice*, Neal-Schuman, New York.

Gratch- Lindauer, B., (2003). Selecting and Developing Assessment Tools in *Assessing Student Learning Outcomes for Information Literacy Instruction in Academic Institutions*, ed. Fuseler-Avery, E., American Library Association, Chicago, Il, 22-39.

Krippendorff, K., (2004). *Content Analysis: An Introduction to Its Methodology*, Sage, Thousand Oaks, CA.

Radcliff, C. J., (2007). *A Practical Guide to Information Literacy Assessment for Academic Librarians*, Libraries Unlimited, Westport CT.

White, K., (2016). SDSU Continues to Move Up the US News Rankings. *SDSU Newscenter*.

White, M., & Marsh, E. (2006). Content analysis: A flexible methodology. *Library Trends*, Vol. 55, No.1, 22-45.

Wilson, V. v., (2016). Research Methods: Content Analysis. *Evidence Based Library & Information Practice*, Vol.11, No. 1S, 41-43.