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| **Client:** | Barbara Young | **File:** 24-107 |
| **Dept:** | Art & Design | **Faculty:**  **Student:** |
| **Date:** | 10/22/2024 | **Initial Meeting:**  **Follow-up:** |
| **Consultant and Attendees:** Sumeeth Guda, Barbara Young, Dr. Chong Gu | | |
| **Statement of Problem:**  How do student perceptions of engagement in the built prototype compare to perceptions of engagement in the two unique rooms of a previous study? | | |
| **Goal of this Project:** Journal Article | | |
| **Background:**  The client is a faculty member in the Arts & Design department. They are conducting a follow-up study to assess a classroom design using feedback obtained from interviews, observations, and a survey. The specific tools were utilized in a previous study to develop the prototype classroom (comparing interactions and perceptions of the same subjects in two unique spaces). The client’s goal is to assess the success of the prototype design by comparing perceptions and behavior in the prototype classroom to the original rooms. The design variables from the original study included: ease of movement, single presentation location, ease of eye contact between students & instructors and students to other students. The change with the prototype classroom was to explore the support of short lectures and collaborative group work. Although this is a follow-up study to a study of last spring, the client came to the SCS because she does not know how to compare the data from the previous study to the data collected during this semester’s study (i.e., different students). | | |
| **Progress of project at this time:** Design (Data are being collected) | | |
| **Relevant information presented at the meeting:**  Design:   * The study design utilized a mixed-methods approach (Interviews, Observations, Survey) to triangulate qualitative data. * There are two built rooms with the same layout; Client collected data from both rooms. (WALC 1108, WALC 1132). Both rooms encourage active learning set up.   Variables:   * Tools (all used in previous study) * Interviews (Qualitative): Transcribed and coded * Timed Observations: Timed instrument to record frequency and duration of activities + "engagement" defined as % of students making eye contact with instructor, presentation, peers, or paper/computer as appropriate to the activity. * Behavioral Mapping (Qualitative): Marked location of instructor at each timed interval. * Student Survey (Quantitative/Qualitative): 5-point Likert + open ended response, coded   The survey design was developed in the previous study by client’s collaborator who also completed the statistical analysis in that study.  Current Survey:   * Already got IRB approval. * The students will take the exam are either in WALC 1018 and WALC 1132. * 4 questions total. The first two ask what room the student is taking the survey in, and what kind of class they are taking (e.g., Science, Math, Technology, History). * The Likert Scale question is about how the student enjoyed the class experience, the various interaction-based activities (Group work, instructor interaction, etc). And how they enjoyed taking the class in that specific room. * The open-ended question is about what changes the students would make to the space to improve their learning experience. * Overall responses for current survey: n = 103. * The students were predominantly STEM students, but there were some non-STEM students.   Previous Study Notes:  Previous study compared student perceptions in 2 rooms (n=296), the rooms analyzed were different in design to the rooms in the current study.  The same students experienced both rooms: (Findings resulted in a prototype design similar to the rooms targeted in the current study)   * Due to study limitations that weren’t present in the previous study, the survey (same questions only with room name changes, administered at the end of the semester) only recorded 103 responses for the built rooms. * Student responses were random: self-selected by QR code on flyers left in the rooms. (Not necessarily the same classes observed) * The client has the original data from the previous study that they would like to compare to the rooms built. The prototype the client is investigating is to see how rooms built with the principle of active learning impact learning engagement. The rooms in WALC are prototypes in this case since they were built to adhere to active learning principles. * The students in the previous study were all engineering students, and the two rooms had different layouts (One was an active learning classroom, the other was an engineering design studio).   Meeting notes:  The client first talked about having two rooms in the current study which are almost identical, but one holds 180 students, the other holds 108 students. One has windows, the other borrows light. The client does not want to compare these two rooms. She is concerned with the layout of the rooms in the current study against the two rooms in the previous study, which were not identical in layout. Based on the previous rooms and the feedback from students and instructors in the survey, she created a prototype design to consider the recommendations from the students and instructors.  What the client is interested in doing is a comparison of the rooms within the current study to the ones from the previous study. The client would like to aggregate the results from the current study based on the two rooms since the data collected is roughly the same with respect to the room layout.  After talking about the similarities and differences from the previous study to the current study, the client then talked about the survey and how it was structured. She mentioned that although the survey had the same structure as the one in the spring, ultimately the only change was that one of the Likert scale questions was edited to reflect overall instructor engagement (TA + Professor interaction). The previous survey did not consider TA interaction.  The client came to the SCS to seek consultation on two things. The first was to learn about the analysis techniques to analyze her survey data. As well as to see how to analyze the data between two uneven-sized datasets (n=296, n =103). The second goal was to determine if collecting more data within her current study would be helpful for the analysis.  Concerns:  The biggest issue Dr. Gu had with this project was that even though the client was focusing on the comparison of the room type and room layout within each of her studies. Ultimately there are a lot of confounding variables present which could impact the comparisons of the study. Classroom aside, the types of classes being held were different in that one was an engineering class which leveraged more active learning activities than the other non-engineering class. The types of students have an effect in that the populations were not homogeneous or have similar characteristics for a fair comparison. While creating a model based on the data will be doable and fairly straightforward, ultimately the student effect could confound the response, hence leading to invalid comparisons between the current study and the previous study.  With respect to including more students in the study, Dr. Gu had some minor concerns with the differences in the size of the datasets, and informed the client that getting more students, especially engineering students, could make the comparisons more accurate. | | |
| **Recommendations for Design and/or Analysis:**   1. The first recommendation made to the client was that she needed to get more data for her current study. Since the students in the previous study were all engineering students taking the same class, it was recommended to the client that she gather more data from engineering students in the rooms which she is doing her study in. 2. With regards to the analysis of the survey data. The client is interested in treating each of the Likert-scale questions as individual questions rather than pairing them up or aggregating the data. For this reason, the model will be an ordinal model of the following form (Assuming the predictors are continuous), as well as analyzing each of the 6 Likert questions separately:   (Satisfaction) = room\_i + individual\_j + subject\_effect + error  Fit the data to the model and potentially look at the interaction terms. Use ordinal regression, including the factors, and interaction between the rooms. Because the client has 103 students in total in the current study (60/40 split between the two rooms). Dr. Gu wants enough data for the current study to be the same or similar to the previous study. If she gets more engineering students, then the subject effect could become more equal.   1. Whatever difference we observe in the survey might not be the difference of just the room. If it is the same courses, we wouldn't need to worry about it. If different courses, we need enough base for comparison. If needed, exclude certain people from the survey to minimize the effect on the subject so that the only effect will be the room difference. Because the current data is a bit messy, we can use the previous study data set (The n=296 study) on the model, and see how different the responses the rooms are amongst the engineering students. The same individuals are in the same room, the rooms are being compared. At least for this cohort we can see if the room has any effect on the engagement. Very clean previous data for modelling the results using the model from (2).      1. Since the current study is also tracking the instructional activities and how the students engage with them. From other studies, to measure engagement it measured eye contact. For the analysis, look at the survey plot the response to each question. Plot together the 4 rooms, and see how many differences between the positions. The later ones might have different scattering. The y axis is the satisfaction score, x axis is the 4 groups (or) x and y are both responses to the different Likert questions but spread out and use different colors to mark different groups. The client wants to use the later scatterplot analysis, since she is concerned with measuring qualitativeness of the data. To do so, treat the 6 questions like 6 variables and create a jitter plot matrix. For the 4 rooms, use 4 different colors. If the combined 6x6 scatter plot matrix has terrible resolution look at the pairs of plots. | | |
| **Who will carry out these actions?**  Client:   * Send the consultant the data collected so far from both the previous study and the current study. * Collect more data in the current study, particularly by gathering more data from engineering students within the 2 rooms. If there are not enough engineering majors in the class, the client may also have to include students deemed with equivalent backgrounds for the purpose.   Consultant:   * Work on the analysis technique and produce the visuals for the previous study data under the model framework presented in the recommendation section. Create the jitter plot matrix for each of the Likert scale questions. Do the programming in R. * Present findings to client, and explain the results. | | |
| **Status:** Follow up not needed | | |

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