Leveraging Participatory Design and User Experience Methods to Collaboratively Envision an Inclusive, User-centered Writing and Design Lab

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Abstract. This article presents findings from a user-experience (UX) participatory design study informing the design of a new university writing and design lab. For this qualitative, mixed-methods study, we collected digital survey responses from 80 students and 17 faculty, conducted semi-structured interviews with 15 faculty, facilitated UX design sprints with 15 students, organized experiential learning projects for prototyping with 5 unique sections of undergraduate courses, and conducted usability testing of the writing lab website with 22 participants. By sharing our mixed-methods research design, participatory design processes, data collection insights, and findings, we provide an example of how diverse stakeholders with competing needs can collectively ideate human-centered design solutions that are accessible, usable, equitable, and inclusive for end users.

Keywords: writing centers, participatory design, user experience, inclusive design, experiential learning

Introduction

In technical and professional communication (TPC), scholars have implemented design thinking approaches in their teaching and research, as they work to recognize and address bias and to reimagine more just and inclusive futures (Jason Tham, 2020; Liz Lane, 2021). Writing center studies have also increasingly incorporated participatory design methodologies and usability testing methods to develop more user-centered services (Michael Salvo, Jingfan Ren, Allen Brizee, & Tammy Conard-Salv0, 2009). Furthermore, like TPC, writing center scholarship is deeply concerned with equity and social justice (Wonderful Faison and Frankie Condon, 2022; Kiara Lee, 2020). However, these two areas are not often in conversation, despite their shared commitments. This article draws together research on participatory design in TPC and writing center studies as a frame for our own journey applying design thinking in the programmatic development of our university's inaugural writing and design lab.

To envision and build a lab that could effectively meet the needs of students and faculty without falling back into limiting assumptions about our users, we needed an inclusive programmatic approach. In this article, we detail an interdisciplinary participatory design & user experience (UX) study aimed at discovering how our new university writing and design lab should best be conceptualized, resourced, launched, and supported at our small, specialized STEM institution. As part of this multiyear participatory design & UX study, we sought out stakeholders from across campus and created a range of experiential learning opportunities for students in technical and business communication, human factors psychology, and user experience writing, seeking out and bringing together insights from as many members of our campus community as possible.

Design thinking and participatory design were vital for our programmatic work in three ways. First, participatory design facilitated a practical commitment to inclusivity in our program-building. Participatory design invites users to move from research participants to co-designers. As Clay Spinuzzi (2005) contends, participatory design "has an explicit political-ethical orientation: to empower workers to take control over their work" (p. 167). We wanted to intentionally amplify the agency of users (Godwin Agboka, 2020), especially students and users from marginalized and minoritized positionalities; many on our faculty research team identify as white women (a group that is commonly overrepresented in writing center work), and we know our perspectives are often constrained by privilege. Natasha Jones, Kristin Moore, and Rebecca Walton (2019) argue for the necessity of center-

ing and valuing marginalized perspectives to make "space for people to move toward the center, allowing them to shape, re-imagine, and re-envision the institutions and organizations forming the context for much of TPC" (p. 9). Our participatory design approach aimed to empower students in helping create a campus resource that would directly serve their needs and goals.

Second, participatory design and design thinking encouraged us to think expansively about what writing centers can and should be. Many of us have worked in writing centers and digital studios at large research universities staffed by professional writing center administrators and English major peer tutors trained in semester-long writing center courses. In contrast to these sites, our current context at a STEM university without English or Communications majors necessitates a different approach. A participatory design methodology facilitated our efforts to customize our programmatic development process for a unique campus community where students study a relatively small range of disciplines (primarily engineering, aviation, and cybersecurity). Rather than simply replicating elements of our previous writing center experiences, we wanted to give our students space to define for themselves what they needed. This process has enabled us to strike a balance between following established best practices in writing studies and innovating solutions most appropriate for our context.

Finally, a participatory design methodology as a means of program-building and conducting research furthered our department's goals to increase experiential learning across the curriculum. Our collaborative, inclusive, design thinking approach is one way we are demonstrating the value and broadening the impact of our technical and professional communication program, and a student- and faculty-designed campus writing center will help us continue to do so. The new writing programs that emerge from this participatory design project will create spaces for co-learning and co-teaching across engineering, design, and business programs, as well as support effective university-wide collaborations to support students' writing and communication skills throughout their academic careers.

This article chronicles our agile, interdisciplinary research efforts to elevate student and faculty perspectives across all four colleges on our campus, to invite various stakeholders to join us as co-designers of the writing lab, and to iteratively apply what we learn to the development of this new campus service. In this article, we use the terms "writing center" and "writing lab" interchangeably, though we do understand the different connotations of each term. User research conducted by our student partners (see the section on student-generated marketing

materials, p. 23) highlighted how tapping into our university's STEM orientation by using "lab"—the "Eagle Writing and Design Lab"—would make the campus service itself more legible and authoritative for our campus community.

Literature Review

Our study draws on design thinking scholarship from TPC and writing center studies. In participatory design, "the goal is not just to empirically understand the activity, but also to simultaneously envision, shape, and transcend it in ways the workers find to be positive. In participatory design, participants' cointerpretation of the research is not just confirmatory but an essential part of the process" (Spinuzzi, 2005). Participatory design involves collaboratively bringing researchers and stakeholders (in our case, students, staff, and faculty) into alignment as co-designers to collaboratively build solutions (Nancy Fried Foster et al., 2013; Harald Holone & Jo Herstad, 2013). These collaborative processes use a task-driven, human-centered design approach to better understanding user needs (Cristiele Scariot, Adriano Heemann & Stephania Padvani, 2012).

Participatory design methodology draws from applied anthropology and applied human factors research. Through human factors are a focal point of participatory design, considering non-human elements and environmental contexts is also key for understanding the roles of objects and their impacts on ergonomics within physical writing spaces (Ole Broberg, Vibeke Andersen, and Rikke Seim, 2011). Participatory ergonomics involves end-users in the planning of workspaces with attention to the collaborative design process (Jean-François Boujut and Eric Blanco, 2003). Space in this context is defined as a tool of thought, action, or production (Miranda Zammarelli and John Beebe, 2019). Currently, researchers in participatory design and design thinking (for example, Temptaous Mckoy, Cecilia Shelton, Donnie Johnson Sackey, Natasha Jones, Constance Haywood, Ja'La Wourman & Kimberly Harper's 2022 special issue on Black TPC) are advocating for equity-driven work, from moving beyond Eurocentric perspectives to actively designing for social justice (Jones, Moore, & Walton, 2019). As Tham (2022) contends, "For designers, empathy is the action taken to pursue goals that advance equitable outcomes."

While TPC as a discipline has a rich history of deploying UX methods in programmatic contexts (Kate Crane & Kelli Cargile Cook, 2022; Godwin Agboka & Isidore Dorpenyo, 2022; Carrie Leverenz, 2014), the scholarship in writing center studies on UX methods is more limited. However, writing center studies has long been concerned with ad-

dressing student needs and reflecting critically on practice and pedagogy (Harry Denny, 2010). Jackie Grutsch McKinney (2013) analyzes the narratives shaping much of writing center scholarship, urging practitioners to reflect on our own assumptions about writing center work. Namely, the assumptions that (1) writing centers are cozy homes, (2) writing centers are iconoclastic, and (3) writing centers tutor all students. We are familiar with such narratives and have drawn on them when justifying our work to administrators and the wider university community. But as Grutsch McKinney reminds us, uncritical repetition of these narratives can blind us to other possibilities of writing center work. Our hope is that a participatory design approach might allow us to see beyond these "ideal" writing center narratives to create a resource more thoroughly and practically attuned to the needs of diverse users.

Studies incorporating participatory design with writing center work at Purdue, USC, Harvard, and University of Rochester applied this methodology in reviewing the functionality, impact, and design of writing center spaces to determine how individuals interact and participate interchangeably between physical and digital spaces (Nathalie Singh-Corcoran and Aman Emika, 2011; Zammarelli and Beebe, 2019). Zammarelli and Beebe (2019) conducted a survey of student writing tutors and consultants at the University of Rochester for the very purpose of better understanding student needs about writing spaces. In this study, students participated in the preliminary stages of co-designing by providing input about spatial configuration characteristics and privacy from various locations on campus. Such existing approaches served as a source of inspiration for our own study.

Writing center studies also acknowledge that location is more than just a physical space and that a writing center may also take up digital online spaces. Allen Brizee, Morgan Sousa, and Dana Lynn Driscoll (2012) argue how informed participatory design approaches to user-centered design of virtual spaces can support accessible writing center models for students with disabilities. According to Brizzee, Sousa, and Driscoll (2012), "rhetorically informed user-centered and participatory design can help writing center staff conduct smarter research, build bridges between institutional organizations, and pedagogies that better serve all students who use writing centers" (p. 3). Creating an effective university writing center is always a highly context-driven process which should be richly informed by community needs, institutional precedents, and administrative resources. A design thinking approach offers a way for program development of this kind to truly engage with and include users as co-developers and co-designers of campus

services that will affect their work and lives. Participatory design seeks out and creates opportunities to empathize with user perspectives and learn in detail what they desire in both the physical and online manifestations of the writing center, including the development of resources and tutor training.

Our research here underscores the necessity of continuing to work to create a writing lab that is responsive to the needs of students, faculty, and staff. We present below our guiding research questions and the research design details of our ongoing mixed-methods study, including the range of qualitative methods we have applied throughout the first two year-long phases of the project. Following the methods section, we summarize our analysis and results, discussing how those results have so far informed the planning and development of the forthcoming writing lab. The piece concludes with our next steps and considerations for future research.

Research Design

We applied mixed methods to help us identify and understand users' existing writing/communication experiences, along with their potential frustrations, expectations, attitudes, desires, and needs. To establish a strong foundation for an effective and robust writing lab, we needed to understand the details and nuances of our campus's needs and context.

Research Questions

Informed by the need to enact inclusive, user-centered methods and by the possibility for such methods to help us more powerfully and meaningfully approach the process of developing an effective writing lab for a small STEM university, we designed a UX participatory design study around the following research questions:

> 1. How do students and faculty need and want to communicate in genres and modes across academic disciplines and in nonacademic venues?
> 2. How can a new writing and design lab provide tutoring support and other effective, responsive, user-centered resources for writing and communication?
> 3. How can the material/physical and digital facets of the new studio be designed to most effectively meet users' learning needs?

These research questions have guided our mixed-method inquiries

into the ways our stakeholders currently understand their writing and communication work and the types of resources they find most valuable for helping them succeed in that work.

Incorporating Design Thinking
Since our ideal new university writing lab should serve as academic support hub for all students and faculty across all colleges and disciplines, we worked to ensure that the perspectives, experiences, and voices of a representative range of students and faculty would be included in our data collection.

To that end, all phases of our IRB-approved research embraced user experience methodologies, including design thinking and participatory design approaches. We used surveys, interviews, and design sprints, as well as prototyping and usability testing linked to experiential learning projects. Table 1 maps our research design onto the five stages of design thinking. During year 1, we focused on empathizing, defining, and ideating, with digital surveys sent to faculty and students, interviews with faculty, and design sprints with students (IRB #22-058). In year 2, we transitioned to prototyping and testing through experiential learning projects and usability testing (IRB #23-074). Spacing out our study over two years allowed us to collaborate with as many stakeholders as possible without overwhelming ourselves or our pool of participants.

	Empathize	Define	Ideate	Prototype	Test
Year 1: 2021-2022	Faculty Survey Student Survey	Faculty Interviews	Student Design Sprints		
Year 2: 2022-2023				Experiential Learning Projects	Usability Testing
Year 3: 2023-2024	Gathering feedback				Analyzing feedback for assessment and iteration

Table 1: Design Thinking & Research Design

Research Team and Participants
To carry out this intensive study, we invited both students and faculty

to partner with us as co-researchers in developing design solutions for the new university writing lab. Our research team included key faculty from rhetoric and writing studies, technical and professional communication, and human factors psychology. We also partnered with two student researchers funded by the university's center for undergraduate research. These students enrolled in a human factors analytic methods and techniques course in the Fall 2021 semester and used their emerging expertise in this area to continue our writing lab research into Spring 2022. We developed our research team to intentionally include students and faculty from a range of positionalities.

We also partnered with three Fall 2022 sections of business communication, three sections of technical writing, and one section of human factors performance processing to begin prototyping various elements of the online writing lab. These students worked collaboratively, building on the previous year's research to prototype and test technical writing, marketing, and interface design deliverables. In Spring 2023, students (primarily from two sections of user experience writing) joined the project to participate in usability testing sessions for the revised prototype of the online writing lab interface. Then, during Summer 2023, we worked with three student research partners interested in user experience as we analyzed our usability test data.

In the first year, a total of 17 faculty across all four campus colleges consented and participated in the initial digital survey (see Appendix A), 15 faculty were interviewed (see Appendix B), and 80 students consented and fully participated in the digital survey (see Appendix C). For the UX design sprint sessions, 15 students participated: 3 for the topic of "Learning Outcomes," 8 for "Physical Space," and 4 for "Digital Space" (see Appendix D). Experiential learning partnerships encompassed the most student participants, including 60 technical writing students, 63 business communication students, and 4 human factors students enrolled in Fall semester sections of these courses. For the digital survey informing our usability testing, we had 122 student participants and 3 faculty and staff participants (see Appendix E). Our usability testing included 22 student participants (see Appendix F).

Participant demographics generally reflected the makeup of the institution as a whole: 62% of student survey participants identified as white; 13% as Hispanic or Latino; 14% as Asian; and 3% as Black or African American. 67% of student survey participants identified as male, 28% as female; and 5% as nonbinary or genderqueer. 7% of student participants identified as having a disability; 6.25% had a first language other than English; and 18% were first generation students. There was a nearly even split across class standing as well as the four colleges at

the university (the College of Engineering, College of Aviation, College of Arts and Sciences, and College of Business and Cybersecurity). Ultimately, we attempted to cultivate a representative participant pool to foster a highly inclusive and user-centered approach. Additionally, this inclusive approach will help pave the way for a deeper level of buy-in and support for the writing lab and its services once launched.

Methods

Drawing on the principles of participatory design and design thinking, we implemented a range of research methods that would allow us to empathize with our users and stakeholders, define the specific writing and design needs on our specialized STEM campus, ideate solutions, and prototype and test deliverables. In this section, we offer detailed descriptions of our methods, organized chronologically. We also explain our methods for data analysis in this section. Because most of our internal audience of administrators were trained in STEM-disciplines and particularly value quantitative data, we worked carefully to justify our grounded theory analysis, including our interrater reliability.

Surveys of Faculty and Student Perceptions of Writing Instruction

To better understand the kinds of writing students are asked to complete across the curriculum, we distributed a digital survey to faculty (n=17) via email (see Appendix A). In addition to inquiring about recent assignments faculty had implemented in their courses, the survey prompted participants to describe the kinds of writing instructional support resources they provided to their students. We invited faculty to share their perceptions about students' writing preparedness and the expected value of a new university writing center on campus. Additionally, the survey prompted faculty to share examples of the support they already provide to students and to reflect on what additional support a new writing center should provide.

In addition to surveying faculty, we also circulated a digital survey via email to currently enrolled students (see Appendix C). Participants were prompted to describe the types of writing assignments they have completed in their coursework, the writing support resources they have accessed in the past, and details about their ideal writing tutorial session. This survey also included a range of demographic questions to help us measure the representativeness of our sample.

Interviews with Faculty

We conducted 30-minute remote, recorded interviews via Zoom with a small sample of current faculty (n=15). Faculty were recruited via email

invitations sent out to all faculty members' institutional email address-es. Interviews were recorded and automatically transcribed via Zoom, and transcripts were then checked and edited by a student researcher. Interview participants were prompted to describe the courses and assignments that they teach and to reflect on students' writing abilities and struggles in their courses. Additionally, participants were asked to describe the kinds of writing support resources a new university writing center might make possible, as well as to provide additional information about writing in the disciplines on our campus.

All 30-minute faculty interviews were transcribed, then broken down into 5 segments based on our interview questions (see Appendix B). Segments were then stripped of irrelevant comments and separated further into T-units (each comprising two complete sentences or two complete ideas). The entire data set included 464 T-units across all 5 segments. Two members of our research team then conducted three rounds of coding, first using in vivo coding, then emotion coding, and finally coding for values. We measured interrater reliability for the second and third rounds, as shown in Table 2.

Faculty Interviews				
Segment	Second Round Coded T-Units	Second Round IRR Score	Third Round Coded T-Unit IRR	Third Round IRR Score
S1	9	56%	7	86%
S2	35	89%	98	87%
S3	67	79%	71	66%
S4	76	78%	74	69%
S5	74	82%	64	61%
Overall 2nd round IRR Score		77%	Overall 3rd round IRR Score	74%

Table 2: Results from Interrater Reliability scores for paired coding

Taking a grounded approach to our qualitative analysis, we coded each T-unit using in vivo coding techniques, deriving codes from the specific language used by interview participants. Citing Stringer (2014), Saldaña (2016) explains that in vivo is ideal for such research objectives because "one of the genre's primary goals is to adhere to the 'verbatim principle, using terms and concepts drawn from the words of the participants themselves. By doing so [researchers] are more likely to capture the meanings inherent in people's experience' (Stringer, 2014, p. 140)" (Saldaña, 2016, p. 138).

The insights derived from in vivo coding then pointed us to affective responses related to questions about student writing preparedness and writing support resources on our local campus. To better understand this affective dimension, the researchers developed a set of primary emotion code categories: *frustration*, *anticipation*, *passion*, *pride*, and *disinterest*. Emotion coding, or affect coding, places value on participants felt experiences and allowed us to explore these felt responses can drive solutions and future decision making (Saldaña, 2016). In our second round of coding, we wanted to explore the frustrations, passions, and disappointments that our faculty may feel when working to support students' writing and communication. Second round affect coding included 261 total coded t-units or 56 percent of the total data corpus across 5 segments.

Finally, we implemented a values coding technique. Drawing from Saldaña (2016), we coded the transcripts based on the following distinctions: "In sum, a value is what you think/feel is important. An attitude is how you think/feel about something or someone. And a belief is what you personally think/feel to be true" (p. 168). To generate the values code categories, we identified salient concepts, beliefs, attitudes, and perspectives from across participant's responses and generated 20 distinct primary codes, including *academic writing*, *professional writing*, *diverse student backgrounds*, *language competency*, *ethics*, *familiarity with conventions*, *remedial writing instruction*, *recursive WAC instruction*, *ownership of WID pedagogy*, and *basic writing instruction*. The third round of coding included 314 coded t-units or 68 percent of the total data corpus; we used heat maps in Dedoose to visualize the code frequency.

Design Sprints

We planned six user experience design sprints on campus: three for students and three for faculty. Ultimately, we only hosted the first set of events; faculty participation was extremely limited, and all sprints involving faculty were ultimately canceled due to lack of interest. Each design sprint was oriented around a specific focus for the proposed writing lab: a) learning outcomes, b) physical environment, and c) digital space. The design sprints were hosted in a modular active learning classroom with student participants (n=15) across five smaller participant groups.

To keep each group's experience as structured and consistent as possible, we developed a protocol script for each pair of researchers to use in facilitating the design sprint activities (see Appendix D). During each 90-minute design sprint, students were first provided with some

context on existing writing centers in the United States and informed about the local needs of our campus community. Students, individually and in small groups, were then prompted/guided to complete four timed activities: crazy 8s ideation, how-might-we strategizing, user journey mapping, and a card sorting prioritization activity.

Crazy 8s Ideation

For their first ideation task, participants individually completed a Crazy 8s activity. During this timed activity, students were invited to imagine an ideal manifestation of a new university writing lab and to sketch out specific services and designs that might be possible as part of this campus service. Each participant wrote and/or sketched a high-level concept in each of the eight squares on a folded and unfolded sheet of paper (see Figure 1).
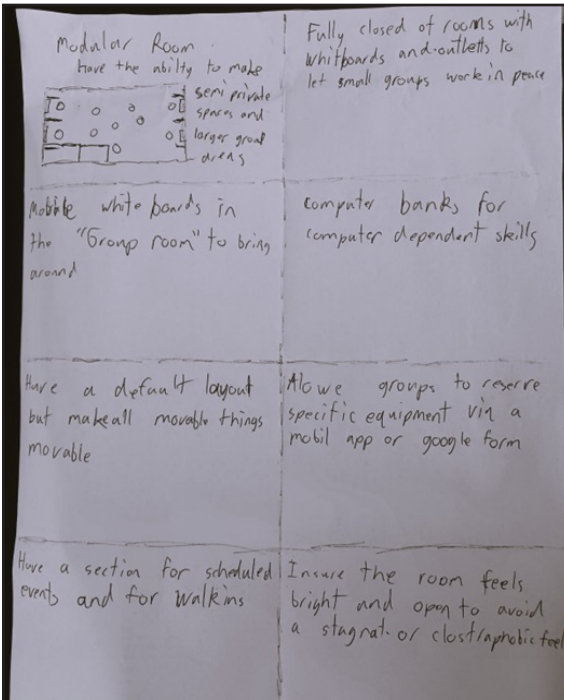

Figure 1: Crazy 8s Example

How-Might-We Strategizing

Following the Crazy 8s activity, students individually strategized ways a new university writing and design lab might actually achieve the imagined possibilities they had previously identified. Students were given blank Post-It notes to identify mechanisms or processes that might

support their envisioned writing lab experiences. Once each student had a collection of ideas, participant groups discussed their individual How-Might-We Post-It notes and arranged the notes into affinity maps, identifying overlapping themes (see Figure 2.)
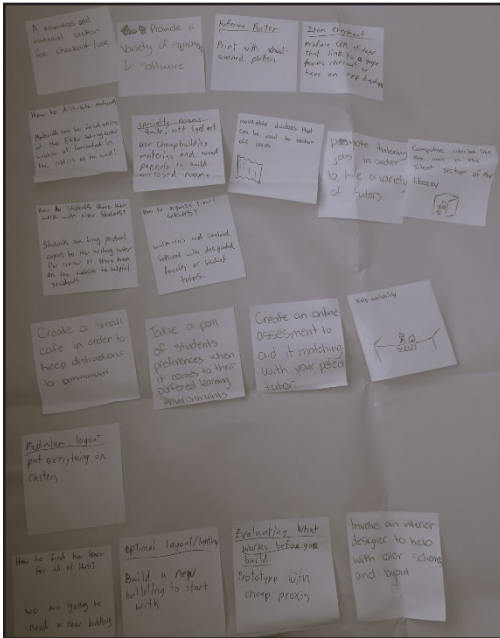

Figure 2: How–Might–We Post-It Notes Example

User Journey Mapping
Student participants were then invited to respond to a user pain point or frustration about the tasks and processes of writing in the disciplines (see Figure 3). Participant groups collectively outlined a user journey map on a large Post-It page, tracing the kinds of academic support resources that a user might hope to find and use at a new university writing lab (in person or online).
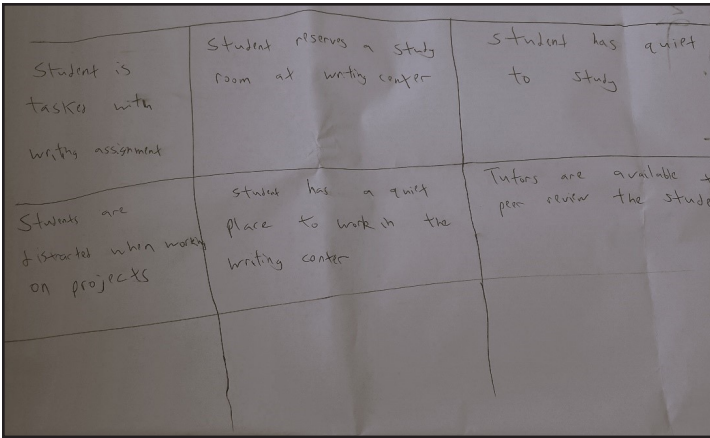
Figure 3: User Journey Map

Card Sorting Priorities with "Must-Should-Could-Won't"
The final activity prompted students to rank prospective elements of a successful writing lab by importance. Index cards were pre-labeled with a variety of potential features (ex: for a physical writing lab, open table space, printers, or bulletin boards, etc.; for the writing lab website, discipline-specific reference materials, virtual tutoring, scheduling tools, etc.) but also included a few blank cards for additional brainstorming by participants. For the Learning Outcomes category, all cards were left blank so that participants could ideate and prioritize potential outcomes free from the bias or limitations pre-prompted topics might create. First, participants were asked to review the cards and/or contribute elements not already provided. Then participants worked to categorize those elements into one of 4 categories: those the writing lab *must* have, *should* have, *could* have (i.e. things it would be "nice to have") and won't or should not have (see Figure 4).
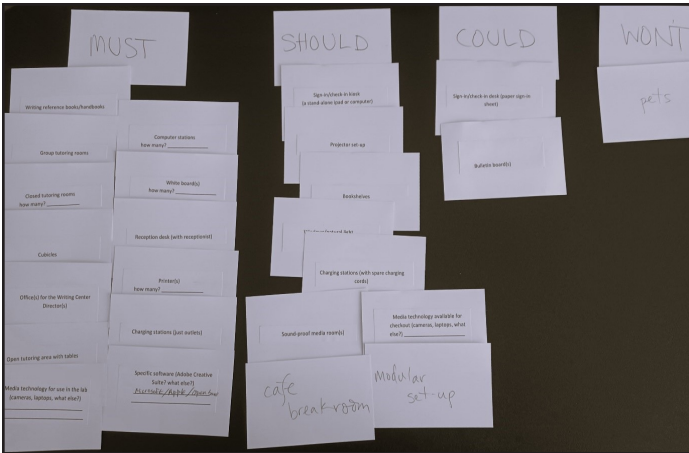
Figure 4: Must-Should-Could-Won't Card Sorting Example

Data from all three UX design sprints were segmented by each of the four distinct design sprint activities, then further segmented into distinct T-units, which were determined by individual words, phrases, or sketches collected from a single artifact or artifact bundle. Data from the user journey maps were similarly broken into T-units based on individual or stand-alone concepts or solutions. In total, we collected 404 participant artifacts across four activities: Crazy 8 sketch solutions (103 T-units), How-Might-We Post-It solutions (70 T-units), User Journey Maps (114 T-units), and Must-Should-Could-Won't card sorting index cards (117 T-units).

Prototyping and Usability Testing
Following the data collection and ideation processes of year 1, we shifted toward prototyping and testing in year 2. We partnered with three courses in the departments of Communication and Psychology: human factors performance processes (1 section); technical communication (3 sections); business communication (3 sections); and user experience writing (2 sections). As part of experiential learning projects in these courses, students had the opportunity to develop prototypes and proposals for key concepts and materials related to the future writing lab. Assignments tailored to the learning outcomes of each course asked students to research and prototype potential website designs, discipline-specific writing guides, and marketing materials to help promote the new lab across campus (see Table 3).

Course	Human Factors Performance Processes	Technical Communication	Business Communication	User Experience Writing
Assignment	Website prototypes	Discipline-specific writing guides	Market research and marketing materials	Usability testing of the website

Table 3: Linked Experiential Learning Projects Across Classes

The following semester, we partnered with students in two Spring 2023 sections of user experience writing to conduct usability testing of the writing lab's new website. We relied on a convenience sample to recruit participants (n=22). Participants included students and faculty and were recruited through Canvas announcements, emails, flyers, and the Sona research platform for psychology students. We surveyed faculty and students about their technology usage and then implemented unmoderated task-based usability testing through Lookback software. The pre-test surveys allowed us to refine the survey and design sprint data from the previous year. The asynchronous recorded usability testing was conducted via the Lookback user experience program (https://www.lookback.com/). Our usability testing concluded with a post-test survey based on the User Experience Questionnaire (UEQ), a standard survey used widely across industry, to provide quantitative data on the effectiveness of the website (https://www.ueq-online.org/). To analyze our usability testing data, we used the Dovetail program to transcribe and code the videos. In our first round of coding, we assessed whether each user met the outcomes for each task in the usability test. In our second round of coding, we looked for pain points and moments of positive user experience across each section of the website.

Results and Analysis

We collected a wealth of data from each of our methods. Our analysis and results are organized in this section according to the five design thinking stages: empathize, define, ideate, prototype, and test. Our analysis at each stage synthesizes relevant data from student and faculty surveys, faculty interviews, student design sprints, student-designed prototyping, and usability testing.

Empathize: How do our users and stakeholders describe their current experiences with writing instruction?

To empathize and understand our users and their needs with regard to writing support, we utilized student and faculty surveys and brief faculty interviews. Survey respondents shared insights into the kinds of writing they recognize as important, as well as the types of instruction and support they already have access to (as students) or provide (as faculty). During interviews, faculty discussed more fully their expectations and attitudes regarding student writing, the importance of writing generally, and what issues they most hoped a new writing lab would help address.

Students' backgrounds and writing contexts

Currently enrolled students who responded to our digital survey (n=80) answered a range of demographic questions and shared their perceptions of both existing and ideal academic support resources for writing. Most respondents (94%; n= 74) reported that English as their first language, but 7.5% (n=6) listed languages other than English, including German, Korean, Russian, Spanish, and Malayalam. Most students (80% or n = 64) also reported that either one or both of their parents/guardians had completed a college degree; only 18.7% (n = 15) indicated a status of first-generation college students. These demographics generally correspond with those of our institution as a whole.

Students also described their experience working in a wide range of writing genres and modes, commenting in several cases on which specific topics they wrote about and for what purpose, course, program, or professor. In a few cases students even mentioned whether they perceived the listed assignments as valuable, as this respondent did:

> "One writing assignment I had was self-evaluations for speech, this assignment was one of the few helpful assignments in the class and was a two-four page essay analyzing how my speech was."

We include here a few additional student responses to illustrate the range of genres, topics, and writing goals that these stakeholders and prospective users of our campus writing lab already recognize and work with.

> "For BIO-403 I wrote a Wildlife Hazard Management Plan. It was

a study of an airport and an analysis of the danger posed by wildlife to aircraft operations there.
In COM-221 I co-wrote a proposal on how to assist college students with learning disabilities."
> — Student Survey Respondent

"I have worked on several Project Reports as part of my classes. They contained clinical descriptions of project chronology and review of the team and its functions, as well as ways to improve."
> — Student Survey Respondent

"I had to work with a group of 4 other people to produce a secure facility design in [Professor Name's] Security Fundamentals class."
> — Student Survey Respondent

Planning and design documents, proposals, reports, and evaluations were only some of the assignments that students mentioned. Traditional first-year writing assignments like rhetorical analyses and research-based argumentative essays also appeared frequently among these results. More uniquely, one respondent also described their writing and copy editing work for the campus newspaper. Team writing assignments were also mentioned fairly often, reflecting the reality that students are expected to collaborate effectively on research, labs, and design projects as well as on the written reports or documents related to such collaboration. We present here a synthesized list of assignment types gleaned from the qualitative responses to question 3: "Describe 2 or 3 writing assignments you have worked on in your college courses. Share which specific courses these were a part of (if you feel comfortable doing so)."

> Rhetorical analysis essays
> Research-based argumentative essays
> Multimedia compositions (maps, websites, digital audio/visual pieces)
> Design documents and specifications
> Recommendation reports and proposals
> Technical manuals and user guides
> Lab reports
> Intelligence briefings
> Project reports

Book reports or reviews
Case studies
Self evaluations
Peer evaluations/team member evaluations
Interviews
Networking reflections
Business letters
Finance reports
Speeches
Presentation slides
Discussion board posts
Journal entries and reflections

These results show that students understand writing expansively and are involved in a range of writing contexts. Students not only seek assistance with traditional alphabetic writing projects but also multimedia projects (slide decks, research posters, etc.) and technical designs (data visualizations, technical diagrams, and engineering designs generated with CAD software).

Regarding the resources they typically draw on as they approach such varied writing tasks, over half of surveyed students (52%) said that they had not previously received any formal tutoring (on or off campus) on any subject, while 48% had used tutoring services either on campus, off campus, or both. Although many students said they did not make use of any formal tutoring, they did report seeking out other resources such as online help from sites like Khan Academy or Chegg, and other universities' public online guides. Most commonly, however, students reported going to a campus tutoring center or directly to their professor for help.

From their survey responses and their engaged participation in design sprints, it seems clear that students generally understand the importance of communicating effectively and value this skill in their academic careers; relatedly, students recognize that successful writing often depends on access to external guidance (either in the form of experts or documented resources) and familiarity with common writing tools, conventions, and workspaces. Using these insights, we can prepare to supplement and extend the campus resources students are already familiar with as we develop core elements of the new writing lab.

Faculty expertise and writing instruction contexts

Faculty survey responses were somewhat limited, but these results and our subsequent interviews with faculty allowed us to capture additional detail about our students' and colleagues contexts—most particularly what types of writing faculty assign and expect students at every level to be able to craft. Faculty survey respondents (n = 17) reported teaching courses at multiple levels, from introductory to advanced; however, the majority teach 300- and 400-level undergraduate courses. This range of teaching experience means faculty were able to confidently share information about the types of assignments included across multiple phases of their departments/programs.

Most faculty reported that they assign a combination of academic and professional writing work, with the specifics varying across colleges and departments. Examples include design reports, verification reports, investigation plans, case studies, discipline-specific documentation conventions (e.g., APA, MLA, etc.), technical reports, business plans, or short academic essays. Beyond traditional writing assignments, some faculty described expansive approaches to writing as composing and designing across multiple modes of communication (e.g., slide decks, oral presentations, technical diagrams, etc.) for specific audiences and purposes. Writing can also include the design of visual material, interactive systems, and a range of other multimedia components. The range of writing genres and modes articulated by faculty here echoes the range reported by student survey respondents.

Faculty reported that to help students understand and master the genres assigned in their courses and programs, they currently provide some instructional resources in the courses that they teach, as shown in Figure 5. The most commonly offered resources included office hours (100%), instructor feedback (82%), and classroom instruction (82%), with rubrics (76%), assignment prompts (53%), and samples of student writing (53%) offered somewhat less frequently. While nearly half of the faculty participants reported providing samples of student writing, this particular resource is one that students rate as in high demand (reflected in results from the design sprints).

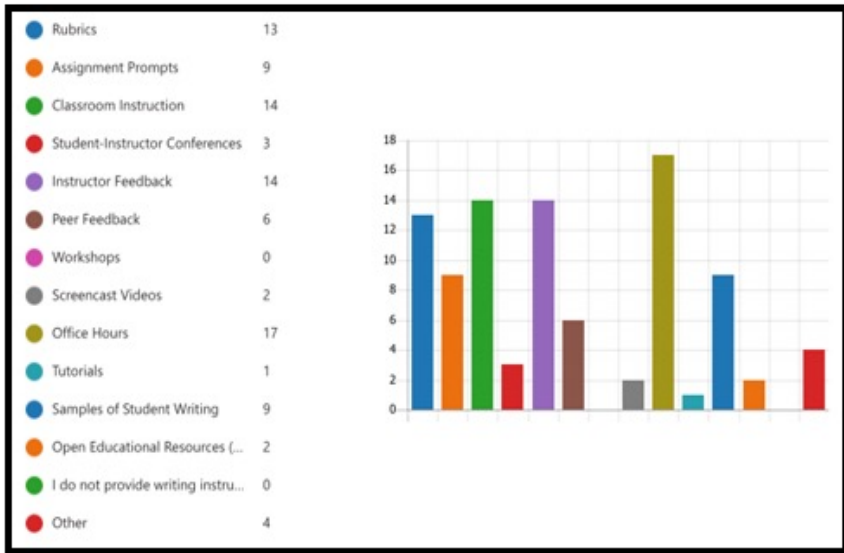|		
🔵 Rubrics	13	
🟠 Assignment Prompts	9	
🟢 Classroom Instruction	14	
🔴 Student-Instructor Conferences	3	
🟣 Instructor Feedback	14	
🟤 Peer Feedback	6	
🟣 Workshops	0	
⚫ Screencast Videos	2	
🟡 Office Hours	17	
🔵 Tutorials	1	
🔵 Samples of Student Writing	9	
🟠 Open Educational Resources (...	2	
🟢 I do not provide writing instru...	0	
🔴 Other	4	

Figure 5: What kinds of writing instruction and support do you provide to your students to help them learn the constraints and forms of the genres you teach? Check all that apply.

Faculty interviews allowed us to probe deeper into our colleagues' beliefs, attitudes, and values about writing, writing instruction, and students' writing abilities. While faculty value writing expertise and expect their students to learn such skills, most felt ill-equipped to teach students how to write in their fields and industries. The layers of in vivo coding, emotion coding, and values coding we applied to interview data helped us identify areas of concern and pain points for faculty, as well as opportunities for our new writing lab to provide responsive support in those areas.

Our analysis shows that the three most frequent emotion codes from all 15 interviews included *anticipation*, *frustration*, and *passion*. The anticipation code was most concentrated in Segment 4, when participants were asked, "If a University Writing Center is launched, what kinds of writing support or writing resources might the University Writing Center provide to help your students succeed in your class?" Faculty expressed positive anticipation and optimism about the proposed writing and design lab, contributing valuable suggestions for the lab could serve students most effectively (see Ideate section, p. 18, for more detail on this).

The *frustration* code was most salient in Segment 3 when interview participants were asked, "Are students prepared for the kinds of writing tasks that you assign?" Given the code frequency counts in

this segment, faculty overwhelmingly perceive that students are not well prepared for writing in their courses. This may be due in part to very high faculty expectations or to a true deficiency of preparation in students' prior courses, or—more likely—some of both. Nevertheless, a perceived lack of writing preparedness is something we should keep in mind as we develop new writing lab programs.

Passion was the third most common code across all five primary codes. *Passion* surfaced most prominently in Segment 5 when faculty were asked what additional information about writing across the disciplines they might provide to interviewers. This code category highlighted moments in the interview when faculty participants expressed enthusiasm, support, and an investment in the importance and value of instruction in writing in the disciplines. Despite faculty frustration with students' preparedness levels, interviewees shared the ways in which writing matters in all disciplines.

In addition to highlighting faculty's key emotions about writing and teaching, interview coding results led us to identify 20 primary topic codes, including *academic writing*, *professional writing*, *diverse student backgrounds*, *language competency*, *ethics*, *familiarity with conventions*, *remedial writing instruction*, *recursive WAC instruction*, *ownership of WID pedagogy*, and *basic writing instruction*, which we then grouped into four primary areas of concern:

- Nuances of disciplinary writing and formatting conventions
- Concerns about varied levels of student preparedness
- Concerns about multilingual writing
- Concerns about "correctness"

The theme of r*ecursive Writing Across the Curriculum (WAC) instruction* was most salient in Segment 1 when faculty were asked to describe the courses that they teach. The presence of this code highlights how often faculty described teaching courses that continually integrated writing across the curriculum, regardless of degree programs or disciplines. Further, *ownership of Writing in the Disciplines (WID) pedagogy* reflected moments when faculty expressed their own personal investment and commitment to providing discipline-specific writing instruction in the courses that they teach. This particular code application was often linked with the passion code from our affect coding round. Faculty interviewees do see themselves as joint stakeholders and influential actors in writing in the disciplines instructional support.

Results from our efforts to empathize with and understand our community's context have helped us see more fully the range of academic and professional genres faculty expect students to gain proficiency in. Our local campus values writing in the disciplines, under-

stands that writing and communication appear in a plethora of modes and media, and shares a commitment to helping students succeed in this area, regardless of disciplinary background. From this context, we felt encouraged to continue inviting direct participation from students and faculty in our subsequent participatory design research, especially the prototyping phase.

Define: What problem(s) are we trying to solve?

Our early phases of participatory design research clarified the context within which our new writing and design lab would need to function. Student and faculty each had specific needs and expectations for the writing lab to address. In this section, we share findings about these needs and move from describing our findings to sharing our problem statement. In the digital survey, students were asked about their preferred mode(s) of writing-focused tutoring. If a writing lab were available on our campus, what would students' preferred mode(s) of writing-focused tutoring look like? Respondents seemed to prefer an option where they would be able to submit their writing digitally for later review and feedback (51%), with the next-most popular option being a 30 minute in-person tutorial session (39%). Student surveys also invited participants to write in responses describing their ideal tutoring sessions. One student described a customizable session that builds upon existing potential and skills:

> My ideal writing tutorial session would be focus[ed] on improving the skills I already know. Taking [an] essay of mine or other writing assignment and finding ways to improve my personal writing which helps cater to every individual's weakness and strengths as opposed to just one uniform way of writing.
> — Student Survey Respondent

In this case, the student advocates for a rhetorical approach to writing tutoring. Such a response and others along similar lines demonstrate students' preference for a writing tutoring style that is flexible and resists prescriptive, one-size-fits-all formulas for writing.

Student participants also identified a wide range of multimodal writing support resources that they believe a new online writing and design lab could make available to students at our university. Faculty interviews and faculty surveys revealed that students most commonly struggle with understanding discipline-specific genres, and this insight was further confirmed during the design sprints. Much like faculty, students also identified that they would benefit from digital writing support to assist with invention, professional style and conventions, and discipline-specific conventions, envisioning an online writing lab

that offered video tutorials, templates, citation generators, invention guides, and an archive of writing samples for specific genres across the disciplines.

Results from the user journey mapping activity offered insights into the kinds of services, tools, and resources that end users desire from a new writing lab. Students were tasked with identifying next steps for an end user who is faced with an unfamiliar discipline-specific writing assignment. Some responses highlighted commonplace pain points or frustrations (for instance, the challenges of audience analysis, professional style conventions, invention, ambiguous assignments, distracting study space, limited space in which to work, or anxiety) that might be addressed through peer-to-peer tutoring, writing samples, live chat options, quiet work zones, and discipline-specific writing re-sources. By highlighting frustrations or obstacles that currently hinder students' attempts to write and revise their own writing, participants began to identify specific gaps in the resources our campus currently offers— gaps that the new writing lab can plan to address (see Figure 6).

The collaborative user journey mapping activity also provided more specific examples of the kinds of digitized multimodal writing support resources that students want, including discipline-specific style guide conventions, searchable how-to guides, invention strate-gies to get started, genre-based writing samples, documentation tools, and materials to assess the rhetorical purpose and audience for their work. The user journey map composite in Figure 6 represents synthe-sized findings from the user journey mapping design sprint activity.
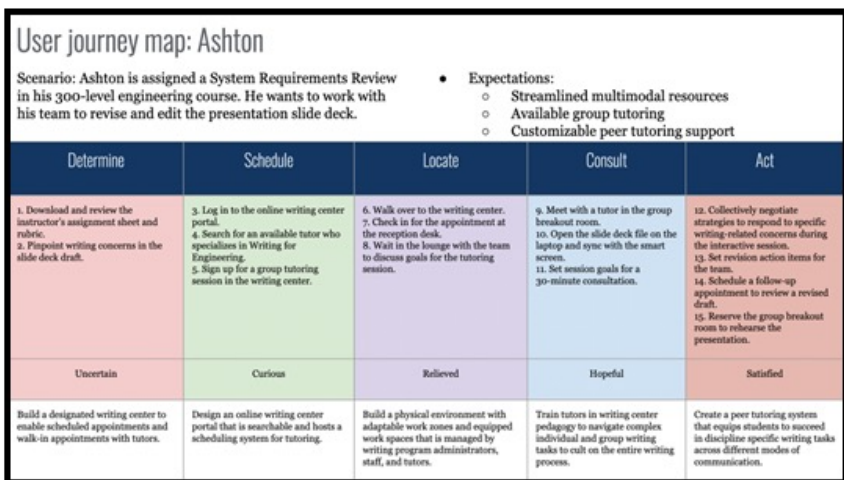
User journey map: Ashton

Scenario: Ashton is assigned a System Requirements Review in his 300-level engineering course. He wants to work with his team to revise and edit the presentation slide deck.

- Expectations:
  - Streamlined multimodal resources
  - Available group tutoring
  - Customizable peer tutoring support

Determine	Schedule	Locate	Consult	Act
1. Download and review the instructor's assignment sheet and rubric. 2. Pinpoint writing concerns in the slide deck draft.	3. Log in to the online writing center portal. 4. Search for an available tutor who specializes in Writing for Engineering. 5. Sign up for a group tutoring session in the writing center.	6. Walk over to the writing center. 7. Check in for the appointment at the reception desk. 8. Wait in the lounge with the team to discuss goals for the tutoring session.	9. Meet with a tutor in the group breakout room. 10. Open the slide deck file on the laptop and sync with the smart screen. 11. Set session goals for a 30-minute consultation.	12. Collectively negotiate strategies to respond to specific writing-related concerns during the interactive session. 13. Set revision action items for the team. 14. Schedule a follow-up appointment to review a revised draft. 15. Reserve the group breakout room to rehearse the presentation.
Uncertain	Curious	Relieved	Hopeful	Satisfied
Build a designated writing center to enable scheduled appointments and walk-in appointments with tutors.	Design an online writing center portal that is searchable and hosts a scheduling system for tutoring.	Build a physical environment with adaptable work zones and equipped work spaces that is managed by writing program administrators, staff, and tutors.	Train tutors in writing center pedagogy to navigate complex individual and group writing tasks to cult on the entire writing process.	Create a peer tutoring system that equips students to succeed in discipline specific writing tasks across different modes of communication.

Figure 6: User Journey Map Composite

Faculty have similar expectations for the new campus writing lab. They hope that the writing and design lab will help students navigate new and unfamiliar university-level writing contexts. They expect the writing lab to provide peer-to-peer tutoring and instructional resources on discipline-specific genre conventions and to introduce students to both academic and professional writing. Additionally, many faculty believe that students for whom English is an additional language may require the writing lab to provide tailored support for their language learning needs. And finally, faculty anticipate that the new writing lab ought to give students the tools they need to proofread and edit their own writing and to demonstrate a command of "correct" or "standard" written English. Some faculty expressed problematic views of writing—for instance, describing what TPC scholars would label deficit models of multilingualism; the presence of these views among our faculty further underscores the need for a writing lab to combat harmful writing ideologies.

Faculty also requested support with teaching writing in the disciplines; in response, the writing and design lab has begun developing embedded workshops that faculty and staff can request for their classes and organizations. For example, this year the writing lab director developed workshops on grant and research writing as well as on communicating scientific information to non-specialists.

Ultimately, our design thinking research led to us to define our central problem as follows: Students and faculty need and want to communicate effectively in a variety of genres and modes across academic, professional, and personal contexts. The new writing and design lab needs to provide tutoring support and other effective, responsive, user-centered resources for writing and communication to students from a variety of degree programs, competency levels, and backgrounds.

Ideate: What should our writing lab look like? What services should it offer?

Our student and faculty participants brainstormed and envisioned various possible systems and solutions that could support their writing, communication, and design work in a variety of rhetorical contexts. Both participant groups described and expressed enthusiasm for several potential writing support resources that the new writing lab could provide, such as the following:

- Peer-to-peer writing tutoring
- Embedded writing workshops
- Group or team writing tutoring

- Student research support
- Student training in writing and communication ethics
- Teacher training for writing in the disciplines
- Archive of writing in the disciplines sample work for students

Students described ideal tutorial experiences that would be helpful, organized, customized, generative, insightful, and responsive to individual learning styles. Further, students' design ideas highlighted the need for staff and writing program administrators to direct the writing lab in-person as well as virtually, and to oversee hired student employees in their tutoring work.

Results from the UX design sprint activities helped us highlight several reoccurring themes among students' ideas. To analyze artifacts collected during the UX design sprints, 10 primary codes developed from a grounded theory approach and then applied to participants' proposed solutions across all three events (see Tables 4 and 5). For all collected T-units, the five most salient codes included: *equipped workspace*, *peer-to-peer tutoring*, *multimodal writing support resource*, *online writing center*, and *design*.

Code	Learning Outcomes	Physical Space	Digital Space	Total Code Frequencies
Equipped Workspace	1	19	2	22
Peer-to-Peer Tutoring	1	14	5	20
Multimodal Writing Support Resources	3	5	10	18
Online Writing Center	4	1	8	13
Design	0	7	4	11
Work Zones	0	7	1	8
Academic Writing	2	5	0	7
Digital Studio	1	4	0	5
Designated Writing Center Space	0	3	1	4
Writing Samples	0	0	1	1

Table 4: Frequency of Solutions Proposed During Crazy 8s Activities

Overall, participant solutions during the Crazy 8s activity prioritized the need for a designated space where students might work individually and collaboratively. Results from the How-Might-We activity emphasized the importance of infrastructures and systems that would enable and support more writing in the disciplines on campus. Though the same code categories were applied to the How-Might-We data, the three most frequently applied codes in this data set included *online writing center*, *design*, *peer-to-peer tutoring*, and *designated writing center space*. A new code category, *staffing*, also surfaced in response to participant requests for trained staff at the new writing lab.

Code	Learning Outcome	Physical Space	Digital Space	Total Code Frequencies
Online Writing Center	2	5	9	16
Design	1	8	2	11
Peer-to-Peer Tutoring	2	5	2	9
Designated Writing Center Space	2	6	0	8
Multimodal Writing Support Resources		3	4	7
Staffing	4	2	0	6
Equipped Workspace		4	0	4
Work Zones	0	4	0	4
Writing Samples	0	0	2	2

Table 5: Code Application Frequencies from How-Might-We Post-It Activities

Ultimately, students envisioned a university writing lab that provides both in-person and online writing support in academic and professional writing. Student participants expressed desire for a simple, easy-to-use online tutor scheduling system that could handle both in-person peer-to-peer tutoring and either synchronous or asynchronous online tutoring formats. Students valued having options to meet in person to review a draft, to meet virtually for an online consultation, or to upload a digital file for later feedback in either written or video form. Students expressed interest in a live "chat with a tutor" feature that could

provide additional online support outside of formal, scheduled consultations. In addition to a convenient and customizable experience, students noted that data privacy and anonymity were also important to them.

The final insight our study revealed is that our students need support for their multimodal design work. Multimodality in writing centers is hardly an uncommon learning outcome, though Jennifer Grouling and Jackie Grutsch McKinney (2016) found that students were less likely to use the term "multimodal" or bring multimodal work to their writing center appointments. However, in spaces explicitly designed for multimodal composition (i.e., digital studios, media centers), students are more likely to engage in creative composition across audio, visual, and digital modes (Stephen McElroy, Jennifer Wells, Andrew Burgess et al, 2015). While we anticipated facilitating student design work with more conventional multimedia programs (i.e., Adobe Creative Suite or web design platforms), our students spoke more about needing resources that would help them create the data visualizations and technical images used in their engineering courses (i.e., those that require CAD, Solidworks, or CATIA). Our students also view this design work as "writing," stretching our prior conceptions of multimodal design.

Writing and Design Lab Physical Space
For the lab's physical environment, students' most common requests highlighted the importance of quiet and well-equipped places to work, with access to relevant analog and digital composing and design tools (for example, group breakout rooms, tutoring cubicles, projectors, computers and software, charging stations, printing stations, audio recording tools, reference books, etc.). Importantly, participants emphasized a modular design that would allow students to remake the space based on in-the-moment needs. In other words, the physical environment must strike a balance between a shared, communal space for collaboration and invention (e.g., group workspace, cafes, lounges, etc.) and separate zones for quiet study and writing. Workspaces in the writing lab, our student participants proposed, could feature modular furniture, couches, chairs, desks, charging stations, computers, projectors, soundproof walls, adjustable lighting, movable dividers, cubicles, cafes, designated breakout rooms, and so on. In addition to advocating for work zones, student participants also imagined plenty of natural lighting, plants, monochromatic color palettes, windows, and other inviting, calming, atmospheric elements. Such a space could also host community-building events, such as writing workshops, writing con-

tests, literary themed events, and so on.

Participants also described the need for an appropriate campus building to house the writing lab, proposing that an interior designer be called on to help build an inviting space where students might work individually and in groups even when they are not receiving tutorial support. Our university's interior designer drafted plans for exactly such a space in the future student union building. Space is at a premium on our campus, so securing a physical location was especially challenging. Findings from our research underscored the importance of having the writing lab in a central location close to other academic support resources. At least for its first year, the lab will be located in the university's library, in a space shared with the undergraduate research institute, allowing us to collaborate easily with one of the main programs introducing students to discipline-specific writing.

Writing and Design Lab Online Space

Students described an online writing lab portal that is streamlined, user-centered, efficient, intuitive, and delightful. Students imagined an interface design that would allow end users to browse, search, and sort information within the platform according to the assignment, course, or project they most needed help with in the moment. Participant groups across all three design sprints endorsed an online writing lab compatible with their existing campus log-ins, one that would house curated writing resources and offer 24/7 support. Additionally, groups recommended options that would allow students to browse tutor profiles, submit their writing into an online portal for review and feedback, and/or chat online with a tutor. Some imagined a page devoted to professor-specific preferences for genres, documentation, and style conventions.

According to the most common themes from student groups' responses to the Must-Should-Could-Won't card sorting activity, a writing lab's digital presence must and should have an easy-to-use interface, with a simple log-in process, online appointment booking, and searchable content. Students also prioritized writing help/guides of various kinds— basic writing, grammar, and discipline-specific writing guides/samples were included as must-haves or should-haves for the online writing lab site. Some student groups also prioritized asynchronous tutoring appointments and virtual "chat with a tutor" features, while others deprioritized these options. We concluded our year 1 research by analyzing the survey, interview, and design sprint data. In year 2, we used these findings to collaboratively develop prototypes of the online writing lab interface, content, and marketing with our

students.

Prototype: How will we design our online writing lab?
We leveraged the opportunities of this study to help our students situate their writing and design work in public, real world contexts, creating linked experiential learning projects across four classes in the Psychology and Communication departments. As numerous studies have shown (for example, Tammy Rice-Bailey, DeAnne Leitzke & Tyra Hildebrand, 2020; Sweta Baniya, Ashley Brein & Kylie Call, 2021), experiential learning can provide students with authentic writing scenarios and offer opportunities for sustainable and meaningful partnerships with organizations beyond the classroom.

Students in Fall 2022 and Spring 2023 sections of technical writing, business writing, and human-computer interaction were introduced to the "client" (the new writing lab) and given a request for proposals. Students reviewed relevant design problem statements and summaries of our findings from year 1, conducted their own "competitor research," and ideated solutions, sharing their deliverables in presentations to faculty stakeholders and to students in the other linked classes.

Interface Design: Human-computer Interaction
Students enrolled in the human-computer interaction class worked in pairs to develop website prototypes. Throughout the semester, students started this prototyping project with reviewing other universities' existing writing center websites, then they conducted additional user research by surveying and interviewing business communication and technical writing students about their online habits and traits to establish product requirements for their prototypes. The students created interface designs using a wireframe tool called Figma by integrating user-centered design principles. After the students built the prototype, they also practiced administering usability tests for their prototypes. Students' prototypes are shown in Figures 7 and 8.
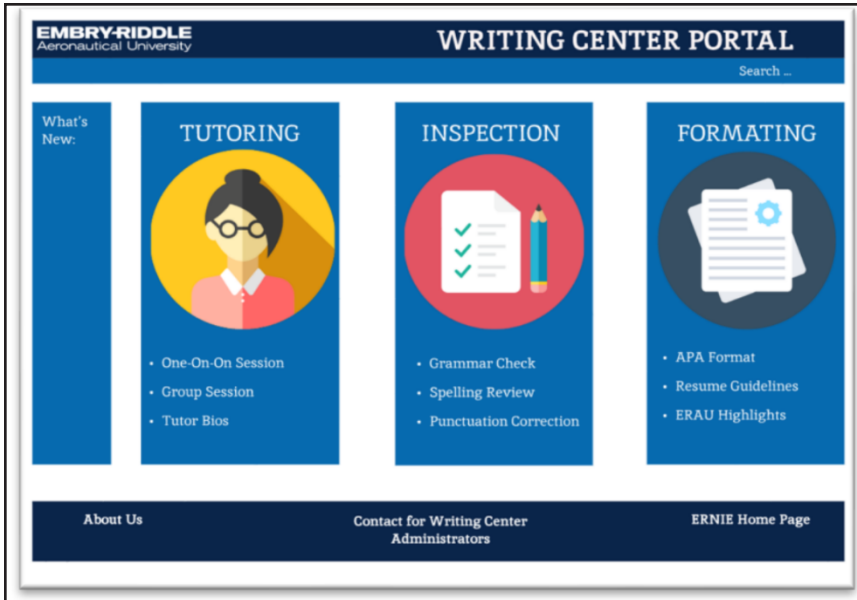
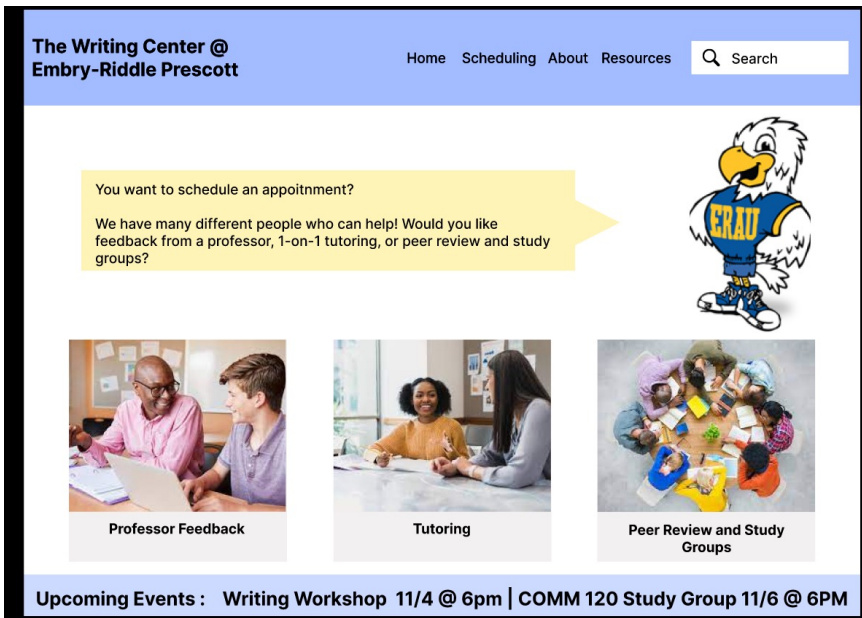**Figure 7: Interface Design Prototype 1**

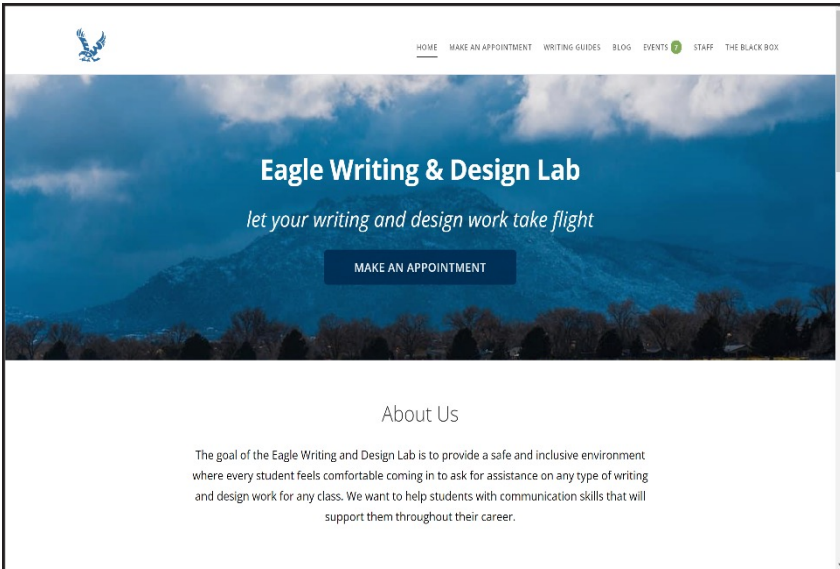**Figure 8: Interface Design Prototype 2**

Figure 9: Current Interface Design

Unfortunately, we were not able to fully integrate all of the students' original designs into the actual website. This semester, the university transitioned to a new website platform for campus organizations, CampusGroups, with highly limited design capabilities (see Figure 9). While we carried over key elements and concepts of the students' designs (minimalist layouts and color scheme, embedded writing guides, a linked online scheduler, and tutor bios), some features were beyond the platform's capabilities at the present (for example, a chatbot or 24/7 tutorial support.)

Writing Guides: Technical Report Writing
Students enrolled in 3 sections of technical report writing developed a range of professional writing deliverables for both external writing lab patrons and internal writing lab personnel, including:
- Writing lab mission statement
- Information about the university writing lab and design studio
- Tutorial on how to use the writing center scheduling software
- Guidelines for following discipline-specific conventions (e.g., those of engineering, aviation, aerospace, psychology, business, etc.)
- Annotated samples of student writing
- Downloadable templates for discipline-specific assignments
- Invention strategies

- Proofreading and editing techniques/tips

Students met with key writing lab stakeholders and learned about best practices for documentation, accessibility, and usability. The classroom instruction for this unit followed a design thinking framework, from empathizing and analyzing the audience to conducting usability testing of their documents. In their feedback at the end of the semester, students reflected that composing for "real" users increased their motivation to learn these principles. Technical writing contributions from these students have since been edited to match a consistent style and posted to the writing lab website's "resources" page, with attribution.

Marketing Materials: Business Communication

A total of 16 student teams in 3 sections of a business communication course researched and proposed potential marketing plans and marketing materials for the new writing lab, in response to a formal request for proposals and a detailed project assignment sheet. The project was designed to be an authentic writing and research experience in line with the learning outcomes of the course, and students were given various options for the types of research and materials they could produce and propose implementation for. Most student teams focused on producing one or more of the following:

- Logo designs
- Digital banner ad template designs
- Physical or digital flyer designs
- Poster designs
- Social media campaigns
- Promotional videos

Several teams focused on logo designs (see Figures 10 & 11) and flyers (see Figure 12). A few student teams proposed more unique materials, including t-shirts, stickers, plans for a grand opening event, tutor recruitment posters, and talking points for campus mentors and tour guides.

Informed by students' research and design proposals, we selected the official name of the lab—"Eagle Writing and Design Lab"—based on student research conducted as part of this project. The writing lab has also implemented the most striking logo design (see Figure 10), and we plan to host a modified grand opening event based one team's proposal.

All student teams generated creative and, for the most part, practical ideas that will inform how the new writing lab staff will promote its services, hours, and location in future semesters. While the proposed materials varied widely in quality and usability, this project allowed

students to engage with an authentic writing situation local to our campus and to contribute uniquely to the design of the new writing lab's visual identity.
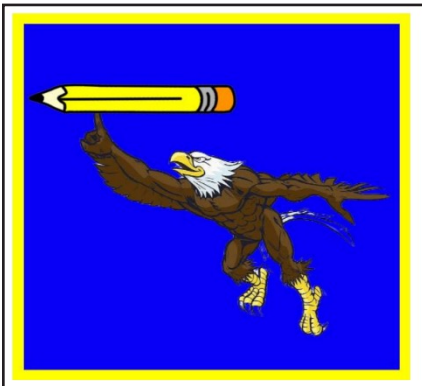

Figure 10: Logo Prototype 1

Figure 11: Logo Prototype 2

Figure 12: Marketing Flyer Prototype

Test: How might we ensure that the online writing lab is user-friendly?
During the summer of year 2, we worked with student researchers to analyze our usability testing data. We analyzed our post-test UEQ survey data, finding that the online writing lab scored highly in pragmatic metrics (for example, metrics about whether users need significant instruction to access the site features) and lower in hedonic metrics (for examples, metrics about the degree to which users see the website as innovative and creative). As a campus academic support service, we emphasized pragmatic metrics over hedonic metrics in our website design.

Our task-based usability testing revealed that some aspects of our online writing lab worked effectively for our users. Users responded positively to the site navigation, the discipline-specific writing guides authored by students, the clear information about upcoming events, and the tutor bios. As one user described, "This [website] makes it very simple to know where to go and who to see. I really like that. It gives a little bio about the person tutoring me as well, [which] helps me to get a sense of how they're going to be when I go to actually see them. And that takes a lot of the guessing out of it. It makes it seem less daunting to go get help." These design features are common across most university writing center websites, but our usability testing confirmed their importance for our audience and context.

More importantly, our usability testing helped us to see users' pain

points. Most problems with our online writing lab interface arose in two areas: the organization of the writing guide page and the sign in process for the WCOnline scheduler. The page hosting the student-authored discipline-specific writing guides used a table layout that wasn't intuitive for all users. One user explained, "I feel like I might have missed that though, the first time. Just because the titles at the top are in the same color, I think, as the rest of the table contents. I think possibly making those titles a different color would help them stand out a little bit." Students also experienced challenges logging into the scheduling platform. The multistep process of registering for an account initially dismayed some users. One common theme was described by a user as follows, "there are instructions over here. It's kind of a lot of instructions on, to be honest. It's a little daunting." We are currently revising the online writing lab's website to address these design problems by adding a search feature to the writing guide page and by implementing WCOnline's single sign on feature to enable users to access the scheduler with their university credentials.

Our programmatic assessment underscores the recursive nature of design thinking. As we officially launch the writing and design lab, we will continue partnering with students and TPC classes to expand the lab's repository of discipline-specific writing guides and conduct additional usability tests for writing lab offerings. We are currently working with student researchers, the undergraduate research institute, our campus's chief diversity and inclusion officer, the women's & diversity center, and the office of institutional research to develop an assessment plan for the writing and design lab's first year. Our central aim is ensuring that we are serving all students effectively, especially underrepresented students. To that end, we will collect demographic data on users, co-sponsor research writing events with identity-based student groups (for example, the Society for Hispanic Professional Engineers and Women in Aviation) and develop metrics for equity outcomes.

Limitations

Our study has several limitations. Our university is a small, STEM-focused institution, constraining our ability to generalize about how our approach might apply at other types of institutions. While our participatory design approach has centered students and other stakeholders as co-designers, we could have gone further in ensuring our participant samples were more representative. For example, while we included staff when sending invitations to participate in interviews and surveys, many saw our work as only pertaining to faculty and did not participate. The demographics of our student participants gener-

ally matched the broader demographics of the university to within a few percentage points, with only a few exceptions. Native Hawaiian and Pacific Islander and Alaska Native students comprise .3% and .6% of our institution but were unfortunately completely unrepresented in our data.

Next, the learning outcomes design sprint branched out into topics we expected the design sprints on physical and online spaces to focus on. While it may be that students found discussing abstract learning outcomes more challenging or discussing practical affairs more interesting, students' relatively off-topic contributions from this session may stem from a failure on our part to frame that design sprint's focus clearly enough.

Finally, and perhaps most critically, we faced challenges contextualizing problematic responses from faculty about writing standards and students' (especially diverse and marginalized students') abilities in internal deliverables. For example, this research illuminated the ways in which many faculty on our campus hold deficit models of multilingualism. In our internal reports to key stakeholders responsible for funding, we tried to emphasize the need to support faculty teaching without reinforcing these deeply entrenched attitudes that aren't in line with the inclusive student-affirming values that writing scholars center and prioritize. As we launch the writing and design lab, we face the challenge of navigating and confronting these problematic views, while working to help shift the mindsets of some on our campus.

Conclusions & Suggestions for Future Research

In this article, we demonstrated how a participatory design approach could be used to increase the agency and involvement of research participants and contribute to a richer understanding of writing needs at a small STEM institution. Results from year 1 of this research informed our institutional proposals for funding and support. During year 2, we implemented experiential learning projects, working with students to create various deliverables for the online writing lab and related channels. As we reflect on and synthesize insights from the results we have analyzed thus far, our goal is to continue prioritizing user-driven recommendations and draw on users' lived experiences in our programmatic development processes. Our local campus values writing and communication across the many STEM and STEM-related disciplines and shares a commitment to helping students succeed in this area, but as our research also shows, students and faculty need more support in more effectively teaching and learning the complexities of both academic and professional communication across genres and disciplines.

Input from local faculty and students has confirmed this need.

Integrating a new writing lab into our campus landscape and promoting it to students will begin to address the need for more robust and flexible writing support on our campus. In year 3 of this project (2023-24), we will leverage everything we've learned to launch the Eagle Writing & Design Lab, invite all writers to access its resources as needed, and continue the assessments and re-evaluation needed to maintain such a campus service and its offerings in the most effective ways.

With this account of our ongoing student-centered participatory UX research, we hope to inspire other programs to incorporate this type of study as a key ingredient for program development. The user-experience research methodology we have outlined— baseline interviews, surveys, design sprints, and collaborative prototyping— are flexible and can likely be adapted for any other campus service, curricular program, or assessment program, whether aimed at students, faculty, staff, or a combination of all three. For our programmatic development process, a participatory design methodology has helped us establish a strong foundation for a robust, sustainable writing lab that will serve our campus effectively. The user-centered participatory design approach we have taken with this process and research has increased stakeholder buy-in (as evidenced by our writing lab obtaining funding from multiple sources on campus), and ideally will ensure a more effective and successful service that remains in tune with the contexts and needs of our specific location and community.

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