The Capstone Journey: Touchpoints and Temporalities in a Redesigned Master's Capstone Process

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Abstract Capstone experiences provide important opportunities for learning that integrates theory and practice while developing situated and reflective knowledge. However, reflection and integration are challenging to plan and enact from a programmatic perspective. In this article, we discuss how students' perceptions and experiences of academic time shaped their perception of a capstone course in our master's-level technical communication curriculum. Drawing on our observations of students' performance in the capstone class alongside a small-scale interview inquiry, we discuss how we came to empathize with students' experiences of the course and learning process. We follow our analysis with a discussion of how temporalities (as experiences of institutional time structures) shaped our capstone redesign. We designed a capstone journey with many planned student touchpoints both within and outside typical formal curricular structures to address students' perceived struggles. Our article adds to the literature about capstone pedagogy in technical and professional communication by focusing on the role of academic infrastructure (specifically organizational policies, material, and social relationships) on students' perceptions of learning time, while offering a model for capstone redesign that distributes integrated learning across multiple interactions with people and information.

Keywords Capstone, graduate education, temporality, user journey, pedagogy

Capstones are enduring, project-based pedagogical experiences in many technical and professional communication (TPC) programs. In our local context, we have struggled in recent years with adapting our graduate-level capstone projects and course to students'

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evolving learning and professional needs. Our interest in capstone pedagogy arises from a desire to use integrative and reflective pedagogical approaches to help students build knowledge that can be adapted to new contexts. We have found that existing higher education temporalities often resist this kind of learning. By temporalities here, we refer to "durable means of perceiving, experiencing, and 'making' times (as we also perceive, experience, and re/create spaces in relation to wider discourses, histories, and contexts)" (Bunn et al., 2019, p. 1410). Students' ways of moving through the world and perceiving the time and space of learning are habituated through everyday participation in courses, semesters, and academic years—through their interaction with institutional infrastructures. We find that higher education institutions often encourage ever more modular segmentation of learning in our course offerings and ever more-individualized educational trajectories. These orientations to educational experiences, endorsed by educational institutions and discourses, create challenges for the kind of learning associated with capstone courses and projects. As a result, the integration and synthesis associated with effective project planning, aligning learning over time, and connecting important course concepts to career goals may be particularly difficult for students who are habituated into thinking about learning in more short-term and disconnected ways.

In this article, we draw on recent literature, our reflections as instructors and administrators working with an MS in Technical Communication program, and a small-scale interview analysis to highlight the often-overlooked role that habituated responses to academic temporalities play in affecting students' capstone experiences. In doing so, we offer a reflection on capstone courses that emphasizes how focusing on temporalities can inform new learning designs. Drawing on interactions with students, we suggest that achieving the learning goals associated with capstone projects means finding creative ways to scaffold integrative and reflective practices throughout a program of study, intentionally arranging interactions with people and information. This work of scaffolding is challenging, however, because it often exists in tension with how higher education is structured, thus causing tension around issues such as labor for both students and faculty.

To provide an example and draw out these themes, we describe the recent experiences in and redesign of our master's-level capstone process, which was reimagined to create a more coherent student-user journey through a master's degree program. With a focus on programmatic lenses, our example explores how we have tried, failed a few times, and tried again to create a more integrated and scaffolded learning experience for students in a contemporary higher education setting. Based on what we have learned, we provide a

contextualized example of why programs may want to consider shifting from positioning a capstone course as a standalone, culminating learning experience into understanding it as an activity or process distributed across formal curricular and co-curricular programmatic "touchpoints" over time, to borrow a term from user experience design. Again, we approach this discussion aware of the difficulties of doing so and of our own ongoing struggles to effectively adapt to students' changing learning needs.

Capstones in Technical Communication Pedagogy

Capstones are typically project-based learning experiences that enable students to synthesize and apply knowledge gained through a program of learning. They are also typically associated with times of transition from academic learning in a degree program and into whatever lies beyond, which most students, faculty, and program directors hope will be the beginning of a meaningful professional career and the beginning of life outside the university as an educated citizen (Durel, 1993). Capstone experiences are generally associated with synthesizing and integrating prior disciplinary learning rather than introducing new concepts (Henscheid, 2000); thus, capstone experiences vary significantly across different academic disciplines, where different kinds of research and practical experiences will be central to students' learning and future practice. For example, capstones in many disciplines are academic research experiences that involve a long, developed paper including academic problem-setting, primary research or extensive literature review, and presenting results and conclusions (Hauhart & Grahe, 2012).

Technical communication capstones can vary significantly but have a few distinguishing qualities. Lisa Melonçon and Joanna Schreiber's (2018) extensive study of undergraduate capstone courses across technical and professional communication programs in the US was helpful for identifying unique challenges, as well as for describing similarities and differences across programmatic approaches. As Melonçon and Schreiber described, technical and professional communication (TPC) capstones can take on wildly different forms, from independent studies to topic-based courses to courses that facilitate completing individual or group projects. Within this diverse conceptualization of what capstones can mean, Melonçon and Schreiber found that 73% of undergraduate TPC capstones involve project-based client work and 66% include a portfolio, both of which add complexity to the kinds of knowledge and work that students are expected to practice. The importance of client projects is not surprising, given the important role that these experiences play in helping students understand the realities of technical communication in practice (Kramer-Simpson et al., 2015). Melonçon and Schreiber further argue that the knowledge and integration expected of TPC capstones is complex because of the

inherently fraught relationship between academia and industry in TPC. While, in general, capstones often involve students in independent research or creative production in which they demonstrate their ability to read, think, and write in ways that align with the conventions of their disciplines, Melonçon and Schreiber argue that capstones in TPC exist at a nexus between both theory/practice and academia/industry that makes the experience in technical and professional communication unique. As they put it, undergraduate capstone curricula position the course as a space that "brings together theories and practices of the academic field and the workplace" (p. 322) but also "brings together the tensions among industry, the academy, and technology" (p. 329). Echoing the disconnects that Jay Gordon (2009) has described, capstone experience can thus easily become too anchored to the goal of "getting a job" or performing in expected and easily accommodated ways for industry and employers, losing the deep conceptual and often disruptive learning that is central to TPC.

Some of the challenges related to capstone projects overlap with challenges in TPC graduate education more generally. Johndan Johnson-Eilola and Stuart Selber (2001) suggested that graduate education in TPC can be challenging to plan and coordinate effectively because of the interdisciplinary nature of faculty expertise, the diverse nature of student prior expertise, and the different goals of graduate students after the degree across different industries and academic fields. Our program expects that our students at the end of their programs will not only understand academic frameworks and knowledge that shape academic conceptions of TPC, but also engage in acts of *praxis* and apply frameworks in organizations they may enter after graduation as employees. Frequently, employing new and innovative TPC strategies also means working against the grain of current practices, drawing on critical and ethical knowledge while leading and guiding new solutions. Melonçon and Schreiber thus argue that we must position capstone experiences to emphasize critical and theoretical competencies, rather than positioning capstones as facilitating easy entry into industry positions.

From the literature on capstones across higher education, we find a broad discussion of challenges that echo and extend what we know from prior field research. Nicolette Lee and Daniel Loton's cross-disciplinary research (2019) emphasizes how capstones are expected to meet a variety of purposes, including increased communication and critical-thinking skills, improving the quality of program graduates, and increasing student confidence and preparedness, just to name a few. These intersecting purposes led Lee and Loton to describe capstone design as a "high-risk activity" that is "weighted with expectations far greater than other curricula" (p. 147). Part of these higher expectations

can be associated with the role of capstones in what Randy Bass (2012) has called the "post-course era," in which courses "are the primary tools for managing time, staff, and resources" but no longer can be assumed to be "the primary place where the most significant learning takes place" (The Post-Course Era section para 1). Instead, experiences that cross courses, integrate learning, and/or provide unique high-intensity experiences are crucial to student success; capstone courses, along with internships, collaborative projects, learning communities, and writing intensive courses function as particularly important ways that students create meaning within higher-education contexts today. When the important integration work for which the capstone is responsible is limited to one course, recent qualitative research documents significant time pressures and obstacles that have called for more structure and mentoring strategies, including attempts to structure capstone learning over multiple semesters and courses (Colclasure & Granberry, 2025; Rice & Shannon, 2016).

While scholarly research in TPC has provided a strong sense of the pedagogical challenges inherent in this kind of learning experience, only a few have discussed how these challenges have affected their own program's curricular decision-making. For example, Dànielle DeVoss, Laura Julier, and Jonathan Ritz (2013) provided an in-depth example of how they designed a portfolio-based capstone course in dialogue with particular institutional "Liberal Learning Goals" and discussed how their position in the College of Arts and Letters affected the possibilities and framing of their course. Most scholarship discussing institutional impact on capstones has focused on undergraduate capstone experiences or collaborative work focused on capstones for students in engineering and computer science disciplines (Burnett et al., 2022). From this prior research, we have learned much about how institutional assessment mandates at particular institutions shape the possibilities for capstone experiences programmatically. For example, Shelley Thomas and Becky Jo McShane (2007) drew on Jo Allen's (2004) work when calling for those designing effective learning processes to take control of assessment "rather than suffer the consequences of 'mandated outcomes'" (Allen, 2004, p. 94). Similarly, Barbara J. D'Angelo and Barry Maid (2009) emphasized programmatic assessment when discussing institutional elements that impact capstones, arguing that "assessment practices are created as a result of mandates or pressure from administrators, accrediting bodies and agencies, or external testing agencies" (p. 160).

While perceptions of assessment are important, we suspect that other kinds of institutional structures beyond programmatic assessment also shape the possibilities for capstone learning. In addition to understanding how TPC has positioned the goal and

structure of capstones, this project is informed by the recent importance of infrastructure as a concept to frame how student learning experiences are deeply intertwined with and co-constituted by relationships with the interconnected policies, materials, texts, people, and technologies associated with a program, department, and institution at large. Recent writing studies focus has emphasized the role of writing process and written texts as an infrastructure for coordinated human activity (Read, 2019; Read & Frith, 2022). Here we draw on the technical communication and writing studies thread of infrastructural scholarship that focuses on the agentive role that relations play on programmatic and curricular possibilities (DeVoss et al., 2005; Grabill, 2010). We thus use the term *infrastructure* to refer to the institutional relational arrangements of people, tools, values, and habits that lend meaning and material constraint to situations in which our students learn. As we will discuss in more detail, university infrastructures became important to understanding capstones because of their role in shaping students' lived experiences of time. Students' enactment of academic temporalities—enabled and constrained by institutional infrastructures taken up through semester calendars and repeated course schedules—played an important role in their assumptions about what constitutes effective learning and participation in a capstone process. In the following section, we discuss our institutional context in order to provide context for those institutional relations and how they shaped our analysis of and redesign of a capstone learning experience.

The Capstone Project in the North Carolina State University MS in Technical Communication

When we began discussions about our master's capstone experience in 2023, our capstone experience had long been institutionalized in our program as a hybrid between a capstone course and an independent study. All students in our program took one required course in their final nine hours called Projects in Technical Communication. This in-person three-credit course was taught by a core graduate faculty member in the technical communication program. While this course was a seated, face-to-face experience, students worked on individual projects that they proposed, building from their prior coursework and work experiences. To guide them, they were assigned to one or more faculty advisors who were not the course instructor. These advisors worked with students on formulating projects, creating project milestones, and writing up and presenting projects to share their learning. All students were required to turn in a written (or designed) artifact, as well as to present their learning in a capstone symposium attended by all faculty from the program. During this symposium, they defended their work while answering questions from faculty members.

Some issues that indicated we needed to rethink our capstone emerged as we realized that there were tensions among what students needed to be able to do in order to be successful proposing, creating, and presenting effective capstones and the realities of our institutional context. For example, in our experience working with students between 2015 and 2023, we found that even our strongest students experienced great difficulty in their project proposal process. At North Carolina State University, capstone courses are one-semester projects. In one iteration of the capstone, we attempted to have students propose their project solely during the 15-week semester in which the capstone was taught. We found that there was an advantage to this approach in that students had strong support from the capstone instructor while formulating a project. However, the major disadvantage was that the typical 15-week schedule did not allow effective time for students to propose, gain permission for, complete, write/design, and present an effective capstone project fully within the course time. It created particular difficulties for students who wanted to do more complicated or robust projects such as IRB-approved research or partnering with clients outside the university who were working on their own timelines. In another iteration of the capstone, students wrote a proposal in the fall semester independently prior to the capstone course. The advantage of this approach was an improved timeline; however, the disadvantage was that students lacked support for effective problem-setting and were often overwhelmed by the critical comments of faculty. Without a great deal of guidance, students, understandably, prioritized the immediate fall course work rather than the capstone work.

To attempt to respond to this problem, our faculty brainstormed a solution that involved moving the capstone course to the penultimate semester prior to graduation, rather than taking it in the final semester. We reasoned that this would enable our program to use another existing first-year core class more strategically as a space where students could work through problem-setting and methods for their projects under the supervision of graduate faculty, while also creating the possibility that students could extend their work beyond the fall semester if needed. While we had initial success in pitching this idea to department and college administrators, eventually this plan failed because our university's Graduate School policies came too much into conflict. For example, university policies and structures designed to provide more time for students to work on capstone or thesis projects (such as waivers that enabled teaching assistants to be full-time with only six hours of coursework) would not be able to be used until their final semester. Moving the capstone into the penultimate semester ultimately failed because it was out of sync with university policies for master's programs.

Thus, when we began the 2023 redesign plan that we discuss in this article, we already knew that the values, beliefs, policies, tools, and habits invoked through activities in our program, department, and university would shape how students approached our capstone. We had already struggled against the constraints that these relations had created for our capstone design. For example, we were aware that the 15-week semester would constrain what a capstone project could be and how students could complete it. Additionally, as directors, we were aware that, while we have a creative faculty committed to industry success for our students and willing to think outside the box about how to work in and around constraints, we would ultimately need solutions that could be sustained in our particular organizational and educational environmental needs.

Gaining Insight into Students' Perspectives on Their Experiences

One element that we knew should further inform our redesign of the capstone course was a better understanding of students' experiences and perceptions. In order to better account for students' perspectives, we drew from IRB-approved[1] interviews with recent graduates of our program from the years 2023 and 2024. This inquiry was part of a larger project that one of the authors took on when beginning a role as the department director of graduate programs. In this project, the researcher invited recent graduates from across the department's three master's-level graduate programs to discuss their program journey from initial recruitment to coursework to culminating capstones to graduation, using semi-structured interviews that asked students to narrate their perceptions and experiences. To recruit students, she sent an invitation email to all students who had graduated in the previous five years who had indicated in exit surveys that they were open to receiving future email from the department.

Four graduates of our program from the years 2023 and 2024 responded to this email invitation as part of this project and completed the in-depth, semi-structured interviews with one co-author. While the number of students interviewed was very small, our goal for using this data in our capstone redesign process was to add depth and nuance to what we knew about students' experiences of the capstone based on our access to other assessment materials such as students' perceptions of instruction and student exit interviews (not discussed in this article nor covered under this IRB). The students interviewed represent a number of common user types in our program: a full-time student with a teaching assistantship, a part-time student working full-time while finishing the

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program, a full-time student who did not have funding to attend and commuted a long distance, and a full-time student who transitioned among roles during their time in the program. The goal was to conduct a small study that enabled program administrators to better understand patterns in how students experienced our programs and their capstone projects, and we believe we reached data saturation around themes connected to the capstone experience even with a small group.

Interviews with students were conducted over Zoom between July and October 2024. Again, rather than focusing only on students' capstone experiences, questions in the interviews were designed to have students reflect on and provide a narrative description of their experiences of time across the degree program, enabling us to better understand how the capstone fit into their perceptions of the experience. These interviews ranged in length from 32 minutes and 2 seconds to 50 minutes and 49 sections. Interview transcripts were collected from the Zoom cloud, corrected, and de-identified. Because of her role in the larger research project as described above, one author analyzed these interviews for themes related to students' perceptions of the capstone experience and also identified major "milestones" in the program experience as articulated by students. To complete this thematic analysis, the researcher used a deliberately interpretive and reflexive approach to trace key turns of phrase, moments of emphasis, and narrative formation. Themes were developed inductively by tracing patterns and relational links across the interviews through interpretive memos, rather than by aggregating discrete segments (Terry et al., 2017). This method was appropriate given the small, exploratory inquiry and narrative nature of the interview protocol and responses. The researcher shared and discussed de-identified memos with the other coauthor, which enabled both researchers to reflect on students' perceptions and perceived milestones as sources of knowledge alongside faculty and administrative perspectives, which we used in reformulating our approach to the capstone project. Table 1 describes student participants with further details about our interviews.

Participant	Graduation Date	Description of Program Experience	Length of Interview
MSTC-a	Spring 2023	Full-time student on TAship within department	40:02
MSTC-b	Spring 2024	Full-time student, nonfunded, commuting	50:49
MSTC-c	Spring 2024	Full-time student, funded on TAship for second year outside the department	34:31
MSTC-d	Spring 2024	Part-time student, completing program while working full-time	32:02

Table 1. Student participants and interview descriptions.

Analysis of Students' Experiences and Themes Shaping Redesign

In this section, we discuss themes that arose from analyzing and integrating our own faculty perspectives on students' capstone struggles with student perspectives articulated in interviews.

Our Perspectives on Students' Struggles

As faculty and program administrators who worked with students, we noted that students struggled to integrate learning from prior courses into their project ideas. Instead, they often approached the capstone as if it were disconnected from prior experiences. Alongside this observation, we noted that students often came up with extremely ambitious project ideas that were not of-scope for a one-semester project. As a result, students often began a project that was much too large and then found themselves three-quarters of the way through the course with a project that could not be completed.

Relatedly, we noted that students often struggled in creating meaningful project management plans for their projects and sticking with them. What became clear to us is that students relied heavily on the rhythms of the semester and project structures and

timelines provided by instructors. Deprived of these, they had no real experience of accurately assessing resource management and project timelines, two key components of successful capstone project management. While many students had some experience working with external clients, those relationships were often negotiated and managed by instructors. In the capstone process, students found themselves having to create their own norms of time-use and relationship-maintenance, rather than relying on a structure created by courses they have taken. We further observed that many of the students had problems in balancing their relationships with their clients, course instructor, and advisors as capstone stakeholders simultaneously. While accomplished in dealing with instructors or clients as stakeholders, having to balance project stakeholders with different projects had become very difficult and, in the students' minds, competing rather than complementary.

Student Perspectives on the Capstone

In interviews, students noted many of the same pain points that we as faculty had observed. However, when paying attention to how students positioned the capstone within their broader experience of the program, students articulated a particular focus on time, affect, and the need for more resources for understanding the range of supportive genres that are coordinated together in the capstone process. Understanding students' experiences helped position the challenges that we described above more from students' own perspectives, which helped us to empathize with the difficulties students encountered with learning within higher education's temporal norms.

First, students described that their overall degree experiences felt like they took place extremely quickly and in a state in which students felt they constantly needed to be accountable for meeting goals in the present, rather than looking forward to the future or backward to reflect on the past. As Participant MSTC-b put it, the attitude they tended to bring to the program was one that put them into a perpetual present: "Okay, I need to get through this this semester. I need to get through these to the next semester." It became clear through discussions that students would need explicit support to remember what they had learned in early semester courses as a result of this feeling of operating in a perpetual present. As MSTC-b said, "I barely remember the classes I took."

In addition, students described experiencing the first year of their master's program as focused on theories and foundations and were often relieved to feel in the second year that they could transition to more hands-on work with information and content. As one student put it, "The first year was like, okay, I have to do this theory and it's not that interesting, but

I don't have a choice" and "a lot of it was more technical towards the second year, which I liked better" (MSTC-c). We take from this that students often felt relief at the idea that they could leave theory behind during the capstone year and that they looked forward to the praxis elements of our program. Of course, we as faculty expected the opposite: that students would use their theoretical and conceptual knowledge to generate both ideas for projects and foundational approaches to complete them. Capstone projects in our program required students to hearken back to the theoretical learning of their first year and draw on it extensively to design approaches rather than leaving it behind in favor of practical work. We found this student perception of experience particularly striking, given Melonçon and Schreiber's call for programs to emphasize the importance of theoretical, critical, and methodological learning, rather than allowing capstones to become overly focused on spaces for a neutral uptake of industry skills.

In the interviews, students articulated how an experience of time and of leaving behind theoretical and conceptual learning often led to feelings of anxiety or dissatisfaction when it came time to put together a great capstone idea, as well as an overt disconnection from much of their more "theoretical" learning. As MSTC-d put it, the capstone moment in the program felt like one where the intensity of the pace of the program really sped up: "Once we got towards the end, it felt like things got very fast like they always do." As a result, the capstone process felt much more stressful than other elements of their experience. As MSTC-c put it, "When I think about that time [of writing the capstone], I think it was more survival mode." For us as faculty, "survival mode," means that very little reflection and learning is taking place. In our interpretation, this feeling of time led to underdeveloped project plans that led to problems down the road: situations like MSTC-c who remarked, "I ended up having to completely like … almost restart the capstone, using a different idea."

Students we spoke with also unanimously suggested support for the capstone project that took place throughout the program and long before the capstone course or even before the capstone proposal. As MSTC-d put it, "I just think a little bit more upfront work so you can plan would be helpful for people like me." Others such as MSTC-c were more specific about the particular timeline that they thought would help provide adequate support to students: "In the … like the first semester or second semester that first year, [students could begin] thinking [about] the logistics of a capstone project. And then, as the students go through electives and get more ideas, they could start putting that together." This student summarized, "We need some constant reminders." We understood this suggestion not as needing more curricular infrastructure but students needing more tools to build their own thinking about what their capstones could or should be and more tools

for envisioning what that work would be like for them. In other words, we saw it as a challenge of demystification and local infrastructure building—providing new kinds of relational resources.

Beyond ways to solve the problem of the temporal experience of the program, students' feedback also suggested spatial interventions that would be poised to overcome the distributed information about the capstone that they experienced. As MSTC-d noted, "When I submitted, I was very much like, I really don't know if this is what I'm supposed to be doing." Other students noted that they were not always aware of expectations or how to find information they needed to progress in their work. MSTC-b also discussed how she had noticed that many students needed support for aspects of writing that might be assumed: "There are some things that aren't taught to students, really, now that they were taught to me. And so that has a big impact on how people perceive instruction in the classroom."

Redesigning Our Capstone Approach

Based on what we learned from students, we had a better sense of how our own insights and their experiences should inform a capstone redesign in the context of the local institutional infrastructures we have described. In attempting to understand students' experiences of the capstone as related to their overall degree journey, we began to understand how institutional infrastructures shaped habits of mind that informed some ultimately unhelpful approaches to our capstone project. Students in our capstone course found themselves in new territories of longer projects with less direct instruction or plan provided to them, while balancing multiple stakeholder needs in a particular course setting. Some of their challenges also related to the unique temporal experience of our program. They were approaching their capstones without much scaffolding to help them remember the "slower" parts of our degree, while experiencing what felt like a faster-paced race to the finish line at the end. Unlike their experiences in courses that provided shared touchstone readings or well-defined deadlines, students were asked to hearken back to a time in their degree that they found convenient to forget.

Similar issues have been discussed in the broader higher education literature. Matthew Bunn, Anna Bennett, and Penny J. Burke (2019) position higher education institutions as "powerful engine[s] of temporal changes" and emphasize that students are often positioned to interpret institutional time structures as "neutral, decontextualised and unproblematic" (p. 1411). Anna Bennet and Penny J. Burke (2017) similarly argue for more complex understandings of "time management" practices, where students are often

encouraged to better manage time without being provided resources or knowledge that will enable them to better understand the temporalities disciplined through academic systems. They show how often "time management" strategies are relayed to students as related to issues of personal responsibility. Closer to home in technical communication and writing studies, Devoss et al. (2005) of course were also concerned with issues of time and temporality in their contributions to bringing infrastructure into understanding students' experiences in our courses.

Through this inquiry, we also began to reflect on the interrelationship of infrastructure and temporality as they informed students' experiences of learning. Infrastructure and temporalities are distinct concepts. Organizational infrastructures (created through relations of policies, materialities, and social structures) created the conditions that supported academic temporalities as unique experiences of time, as well as the accompanying habits of mind disciplined through them. Students at the graduate level, for example, often have been successful in feeling the ins and outs of how to be successful with the academic calendar. They have internalized semester rhythms to classes and have, often as well, internalized where projects will fall within the 15-week increments that we use to divide up courses. This internalized temporality does not come to being through spontaneous generation. Rather, it is an internalization of the expectations and disciplining power of academic infrastructures. While students respond to and are disciplined by these infrastructures and their accompanying systems, they are rarely aware of the policies or digital materialities affecting them. For example, a student might understand the role of the syllabus in shaping their work in a class, including course policies, but they are rarely aware of the work of university committees, requirements made by graduate school for inclusions of policies, reminders from directors of graduate programs, all of which come to bear on syllabus statements.

Thus, to better plan for how students perceived their programmatic experiences, we had to take similar steps as we had in prior years to creatively detach our point of view away from internalized and familiar ways of understanding time and learning in our institution. Students helped us understand that we needed to deal with the temporality of the academic calendar, program progression, and individualized planning demands of the capstone experience in new ways, away from the traditional infrastructure of the university. For example, students' sense of a perpetual present in which they were constantly triaging current work was working against our goal for teaching them foundational concepts early in the program so that they could apply them over the course of their careers. Furthermore, students' sense of relief at finally escaping "theory courses,"

during their first year was working against our desire for students to transfer theoretical and conceptual learning in order to design effective praxis in their capstone projects and future career. It was clear that we needed new tactics both to promote and reinforce their memory and metacognition, as well as new resources in the course itself that worked to take students out of survival mode and into a more comfortable relationship with structuring and planning a project from their own unique interests and positions. Furthermore, we needed to model for students how to create their own infrastructures for successful project completion rather than solving these inevitable problems for them (Hart-Davidson et al., 2007). And, we needed to do this in a way that would not be vetoed by department, college, or graduate school administration because it was at odds with policies or practices external to our program.

We should note, as discussed above, that temporalities do not describe all of the challenges that we found our students were facing, and we do not mean to oversimplify capstone learning challenges by emphasizing habits of mind related to time only. However, we found rethinking temporalities to be a particularly generative means for designing alternative approaches to our capstone. Thus, a first step to redesigning the capstone for the Fall 2024/Spring 2025 academic year was to change our approach to where and how the learning of the capstone course was situated in time and space, distributing the work of capstone preparation across curricular and co-curricular moments and touchpoints across the program. Specifically, we designed an expanded proposal process for the semester prior to the capstone course through which students receive guided support from the program director in remembering and integrating theoretical insights from their first year of course work, understanding the logistics of the capstone course and process, coming up with effective problems to research, and writing an effective proposal that was of an appropriate scope for the capstone course.

In Figure 1, we visualize the overall changes in approach to where capstone-related learning and preparation took place inside our program during the fall 2024 semester as a result of our changes. These changes were made leading up to our Capstone course offered in the spring of 2025. The following subsections describe redesigned aspects of this approach, which begins much earlier in students' time in our program.

	Wk 1	Wk	Wk 3	Wk	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14
Program Wide Listserv Sends	Orientation	Capstone Process for Fall	Capstone Process Description	Capstone Info Session Details					Capstone Draft Workshop Details		Capstone Draft Workshop Reminder			
Individual Conversations					1 on 1 w/ director as needed			1 on 1 w/ director as needed		1 on 1 w/ director as needed			1 on 1 w/ director as needed	1 on 1 w/ director as needed
Workshops						**Capstone Info session**						**Capstone Proposal Workshop**		
Key Questions	"What is the capstone process?"	"How will Capstone work for us?	"How is Capstone used?"	"What is expected of me?"		"What work does a capstone do?"	"What do I want to do for my capstone?"	"Is this a good capstone idea?"	"What are my peers writing?"	"When should I start?""	"What am I trying to do?"	"What have others done with their proposals?"	"What can I take from others to make better?"	"Is this document persuasive?"
Students Deliverables							**Intention Form**				**Workshop Draft**			**Proposal Final**

Figure 1. Visualization of Fall (precourse) capstone process.

A New Support Process

One point that became clear was that interactions with students around the capstone needed to exist long before the capstone course began. These interactions needed to more actively prepare students for the temporalities of capstone-thinking processes. In the redesigned proposal process, the director of the MS program, with students, created six touchpoints (up from two) across the semester prior to their capstone course. The touchpoints were as follows:

1. Describe capstone during orientation
2. Attend capstone information session
3. Fill out capstone proposal intention form
4. Submit capstone proposal draft
5. Attend capstone proposal workshop
6. Submit final capstone proposal

These touchpoints solved several problems we identified in the prior capstone experience. Touchpoints created several, ongoing points of contact in which students would need to explicitly look both forward into their project goals and backward into the courses that had shaped their thinking. It provided the opportunity for the director to provide an overview of the capstone purpose and to review how students might go about choosing a project focus. It provided an opportunity for students to refine over several tries the idea for their research, and it also enabled peer review and discussion.

Additionally, other communication touchpoints were created to keep contact with students and instructors throughout the semester via the program listserv. This constant flow of information kept second-year graduate students oriented to the process even when meetings were distributed across the semester. While intended for second-year master's students, these broadcast messages served two important functions for the department as a whole. First, while first-year students did not directly participate in the capstone process, these broadcasted messages created an early awareness of that process. When they reached their second year, they would already have a sense of what the capstone process would look like from the director's public communication with the previous year's cohort. Much of the anxiety produced by the capstone related to the unfamiliar nature of this new, odd form of university-sanctioned writing. Students struggled with understanding how capstone writing could exist both inside and outside the classroom setting. Thus, by thinking differently about the temporal learning, we were also able to address other issues (unfamiliarity with genre and process) that themselves were not directly related to time. Second, program faculty were busy with their own classes, research projects, and administrative positions. While very familiar with their role in the process, they were not always fully aware of where students were within the process and therefore how to best assist students. Listserv announcements helped orient the faculty to where students were in their process helping them have conversations with students about potential topics and projects. With this drip content, faculty could better field questions and scale answers to the appropriate level for where students were in their capstone process.

Redesigned course sequence and deliverables

By embracing the notion of temporalities, the redesigned course taught students to consider the unique demands of reflective practice and problem framing in technical communication contexts. By emphasizing the intersections of disciplinary knowledge and local contexts for practice, we supported students in solving important field problems, drafting relevant portfolio documents, and writing experience reports that demonstrated mastery of key program learning outcomes.

Making experience reports a key genre of the capstone process in our program was one way that we responded to students' request for more support around the particular genres of the capstone process. Experience reports are identifiable professional genres in our field that are specifically designed to emphasize reflective practice in bringing theories of TPC into dialogue with practical action and design. They are documents that have both academic and industry audiences and authors. When we introduced the deliverables for our redesigned capstone, we emphasized three deliverables: a design or research project,

a five- to 10-page, single-spaced ACM-style experience report, and an oral presentation. We described the project as an individual work that "institute[s] a procedure or solve[s] a specific problem. It might consist of the writing, design, and production of an online or print document such as: a website, a help system, a procedures manual, a technical report, or a protocol." We introduced the experience report as a written document "that describes the exigence for your project, your research/design process and presents reflections on the methodology or applications. Strong experience reports discuss both benefits and drawbacks of design approaches used and clearly call out lessons learned." Our goal for distributing the capstone project simultaneously across three genres was to ensure that students frame projects as multifaceted and meaningful to multiple audiences in multiple ways.

Another change to the capstone course that we instituted involved shifting final presentations into a venue that encouraged more discussion and dialogue between academic and industry audiences. As a result, in addition to fellow students, alumni, and program faculty, we invited our industry networks to hear and respond to our students' capstone projects. Specifically, we reserved sessions in our yearly industry/academia conference organized by our student association explicitly for capstone presentations. Our goal in this shift was to help students more tangibly strive for projects that make contributions to the field that could help improve everyday practice. By shifting from a defense scenario that emphasized students' ability to respond to their professors and toward a public conference presentation that brought academia and industry into conversation around students' contributions, our goal was both to help students anticipate their extension into industry networks while also emphasizing the importance of their theoretical and critical knowledge. Again, students were shown in their preparation that their projects must meet multiple audiences simultaneously rather than those that exist in only the academic temporality they were accustomed to.

Furthermore, we adjusted the timeline and structure of the semester so that students were asked to conceptualize and complete the project deliverable prior to writing the experience report that asked them to reflect on the project's exigence, connection to the field, and implications. The major assignments for our redesigned capstone course included the following:

- **Project Frame and Methodology (final draft due around week 5)**: Students in our capstone course first revisited their proposals from the prior semester in order to articulate a more deeply developed framework for their project. During the weeks prior to this assignment due date, students read brief articles on problem-setting,

common genres of research report writing, and writing effective methodologies. Readings on these topics responded to students' desire for a more detailed discussion of how to approach common research and practical genres in TPC, and we discussed explicitly how academia/industry dynamics in the field would require them to carefully negotiate where they find sources and how they situate the goals of their projects. This important work in the first five weeks of the course prepared students to clearly understand their project purpose, exigence, and methodology.

- **Preliminary Findings Memo and Presentation (due around week 8):** Around halfway through the semester, students drafted a project update memo that provided information on the status of their introductory research and/or deliverable designs. This memo enabled us to have a standard, shared project management milestone that all students must respond to, even as they were asked to take individual responsibility for managing their individual project workflow. This project update and set of drafts enabled advisors to evaluate whether students had made enough progress to complete their projects during the course of the semester, and also created an important moment for receiving feedback around the halfway point of the semester while there was still time for them to change course if needed. Course sessions during this phase of the semester focused on project checkpoints and peer review that built from the particular needs and projects of the students enrolled.
- **Formatted Draft of Experience Report and Final Design Deliverables (final draft due around week 14):** In the penultimate week of the semester, students in the captone submitted a formatted, full draft of their experience report and deliverables for their advisors and course colleagues. These documents represented a completed project that was only subject to requests for revisions from their advisor. During the weeks prior to this due date, students studied the genre of the experience report by reading and mapping samples from ACM-SIGDOC, which enabled them to understand typified responses as well as variability in the genre. They also practiced working with the design templates for the experience report in order to create a document with professional formatting attributes that looked and felt appropriate to be shared professionally.
- **Practice Presentation and Slide Deck (due during week 14):** Students practiced an oral capstone presentation with visual aids prior to the final presentations. The presentation situated and discussed the project's purpose, contribution, and process and uses appropriate visual aids. In the course sessions prior to this session, we discussed effective visual document design conventions for their

presentation and also discussed how the genre of the oral presentation should differ significantly from how they present their project in their experience report.

- **Oral Capstone Presentation and Question/Answer Session (due during week 15):** Finally, students gave an oral presentation of their project followed by a question-and-answer session. In the presentation, students demonstrated rhetorical awareness and an ability to reflect on actions taken in designing and completing the project. We reserved the week between week 15 and the final exam date as a "release valve" where students could address revisions to the project suggested by their advisors.
- **Peer Reviews:** At multiple points during the semester, students reviewed their peers' drafts with productive feedback comments that described, evaluated, and suggested revisions. These comments were assessed by the authors of the paper for usefulness and acceptability based on number and quality.

Takeaways and Final Thoughts

Breaking with elements of academic infrastructure by orienting our solutions away from internalized and familiar temporalities of the university calendar and expected program timeline, we were able to create new patterns of labor and learning for ourselves and our students. The shift in mindset from foregrounding institutional lenses to foregrounding student lenses allowed us to see new educational opportunities for the capstone in our program. At the same time, this move helped us model for students how to plan and manage projects that were not defined by academic temporalities and that required them to work outside course and academic calendar constraints.

As a result of our design, we believe our capstone experience has become better representative of the entire master's experience (both curricular and cocurricular) through integrating applied research product management, client deliverables, and applied disciplinary knowledge. However, we also want to highlight the real challenges of teaching and supporting reflective practice and synthesis in the context of higher educational infrastructures we have described. Our solutions attempt to partially break with existing academic infrastructure restrictions and frictions associated with learning in our institution, but in doing so, they involve students and faculty in work "off the clock," outside of traditional organizational infrastructures such as academic and course calendars. Such work can be devalued by students who may understand it as not meaningful as graded work in ongoing courses. Furthermore, it asks administrators to take on additional work outside of, or at the very least bending, the infrastructures of recognized labor structures that may not be adequately compensated. In other words, learning

solutions that attempt to cross the curriculum and co-curriculum can be labor-intensive, both for students and administrators. They are not solutions or products that fit well into efficiency or customer-service models of education, and it has been the case anecdotally that students have sometimes resisted the "extra work" that has come along with having extended support. We also recognize that we work with a great deal of privilege and autonomy in our Carnegie R1: Doctoral Universities—Very High Research Activity University, which is also classified for lower access and higher earnings potential. While others may not have the freedom or organizational social capital to act as independently or innovatively as we did, we think our project still offers a model for how others may look beyond typified patterns and cycles of time and labor toward more innovative solutions in their own context. Finally, we should highlight that we recognize that our interview inquiry was small and focused, and that further empirical research drawing from multiple forms of data will enable us to analyze both students' perceptions and their direct performance in our new capstone format.

Capstones are powerful educational experiences, "high impact" in the language of our institution. Asking students to engage in meaningful projects that will help them launch careers also means asking them to thoughtfully work within infrastructures shaping their experiences in our programs and universities. More ambitiously, it also asks them to build the infrastructure of their own approach to creating learning and the deliverables that evidence it: new genres, new relationships with clients, and new personal labor practices. The knowledge-building and skills that these challenges and opportunities teach are essential skills for young professionals to have in an uncertain and constantly changing professional world. Students must become comfortable in personal adaptation to be successful in their careers, understanding what infrastructures and practices they must build for themselves. We hope that we have modeled this for students in our master's program, and we look forward to continuing to adapt our approach as our institutions and students change.

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