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‘Why are they not responding to critique?’ – A student-centered construction of the crit

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Abstract: *The crit is a dominant public instructional event, and has often been studied through the lens of institutional power, through the perspective of the instructor. In this study, we analyze the classroom presentations and critiques of three teams in a design-focused human-computer interaction graduate program, calling attention to other modes of student-generated critique that occur alongside the traditional formal conversation. These critiques comprise, in parallel: 1) a public oral critique led by the instructor alongside student questions; 2) a critique document collaboratively authored in Google Docs by experienced students; and 3) backchannel chat by experienced students via Google Doc messaging. Through the complex interactions between these modes of parallel critique, multiple levels of interaction and conversational behavior emerge, with experienced students shaping each type of feedback and use of technological tools. We present and analyze cases drawn from the teams through computer-mediated communication and critical pedagogy perspectives to characterize these interactions, documenting how experienced students take on different typifications—or understandings of role expectations within the conversation—which mediate the instructional qualities of the critique. We introduce three typifications: the relaxed professional in backchannel chat, poised professional in the Google Doc, and instructional tutor in the physical classroom space.*

Keywords: *multimodal critique; critical pedagogy; peer critique; computer-mediated communication; Google Docs*

Introduction

Critique is an essential part of the studio pedagogy experience, creating opportunities not only for formative and summative assessment, but also socialization into the discipline (Cennamo & Brandt, 2012; Dannels & Martin, 2008). Over the past two decades, scholars have documented the communicative characteristics of critique, but this knowledge is largely constrained to a particular physical arrangement with a familiar set of interlocutors—the instructor and the student (e.g., Dannels & Martin, 2008; Oh et al., 2012). New approaches to critique, instigated by alternate pedagogical framings or the availability of technological tools, afford alternative modes of interaction and new classes of participants. In this study we have analyzed interactions that augment a typical classroom critique, using an approach to critique that allows advanced learners (i.e., mentors) to play a mediatory role between the roles of the beginning design students as presenters and commenters, and the role of the instructor. Student mentors enact this mediatory role not primarily through direct verbal interactions, but by building commentary through virtual engagement in two different computer-mediated communication (CMC) channels during the course of critique while beginning design students are interacting verbally. We focus on the perspective of the advanced student and their assigned mentor role, exploring their understanding of role expectations, and how they perform that role through CMC and physical interactions.

We focus on these student-mentors not only because they represent a relatively new class of interlocutor in the critique performance, but also because shifting perspectives from the hegemony of the traditional classroom informs our understanding of how multimodal interactions might impact the dynamic of a critique, and the power relations that often dominate (Anthony, 1991; Blythman, Orr, & Blair, 2007). In this study, we address a gap in the literature through an intentionally critical framing, documenting and analysing a unique type of critique—the *multimodal critique*—where multiple critique conversations occur concurrently around a single designed artifact (or presentation of that artifact), in both physical and/or virtual modes, with multiple classes or groupings of interlocutors.

Review of Literature

The concept of multimodal critique expands our notions of the four traditional categories of critique (Blythman et al., 2007; Hokanson, 2012): the formal design jury, classroom pinup critique, desk crit, and peer critique. We see multimodal critique, at least as partially situated in the formal classroom, as extending our knowledge of the pinup or group crit, as well as the peer critique, although there are implications for the entire taxonomy of critique. We address the critique data through two specific lenses. First, we aim to understand how the alternative media employed here (i.e., a collaborative document and an embedded instant messaging system) function as communication devices within a constructed socio-technical context, and, secondly, we employ critical theory to better understand the meaning-making and power relationships that result in this shift to a virtual, student-shaped space.

Critique as Framed by Critical Pedagogy

A critical pedagogy perspective has historically been used in design education to call attention to a student perspective of pedagogy, often alongside issues of instructor and institutional power and gender inequity (e.g., Blair, 2007; Dutton, 1991; Webster, 2006;

Willenbrock, 1991). More recent research has framed up the lack of attention to the social world in which design students develop (e.g., Gray & Howard, 2014b; Oak & Lloyd, 2014; Webster, 2008), calling attention to the students' own construction of knowledge within and outside of the formal pedagogy (Gray, 2013, 2014) and the impact these interactions might have on the overall instructional approach used by instructors. By exploring the extant power structures of design education, scholars have found that students take on different levels of control in peer-to-peer critique than might be expected from the kinds of communication present in public, instructionally-mediated critiques (Gayol, 1994; Gray, 2013). Moving beyond viewing learners as *tabula rasa*, or blank slates (Freire, 1970), this critical perspective reveals that students may identify themselves not only in the *student* role, but also, frequently, as proto-professionals who have already begun performing a professional identity, albeit within an educational context (Gray, 2014). With the increase in potentially relevant technological tools, critique as we know it will change, and thus it is vital that we understand how critique practices are already being adopted in transmedial ways, allowing different modes of participation than current practices might suggest. Using this theoretical frame, the results of this study are not intended to advance a specific instructional theory. Studies that take on a critical pedagogy approach are intended to advance an understanding of the learner and the instructional design as it is employed in context, not the theory itself. Taking on a critical perspective allows the documentation and understanding of *in situ* practices, but does not propose the intervention as an intact instructional solution, nor is it meant to resolve the complexities of the instructional design. Rather, the aim is to better understand a student-created instructional process that has its roots in the formal pedagogy, yet exists somewhat apart from it. Within this critical frame, a major component of understanding the meaning being made by learners is developing a rich understanding of how understandings of identity and identity performance emerge through communicative acts (Carspecken & MacGillivray, 1998).

Developing and Performing a Design Identity

Students develop their design expertise over time, mediated by formal instruction (Schön, 1985) and their socialization in extracurricular spaces (Gray & Howard, 2014a). This expertise can be productively viewed through the lens of identity—understanding what identity claims students take on, and how these claims alter the way a student views the world (e.g., Siegel & Stolterman, 2008). In an empirical sense, the development of design expertise can be viewed by documenting the roles a student might take on, which are invoked through a range of typifications (Carspecken, 1996). The related concepts of typification and role represent how an individual relates herself to a specific communicative act or interactive setting. Carspecken and MacGillivray (1998) define typifications as 'specify[ing] a range of possible roles as well as norms, audiences, and such things as interactive rhythm and tempo' (p. 179). Typifications and roles are present in our everyday lives, with roles more easily switched than typifications, which are less permeable and more entrenched. A design student may switch between the 'student' role and 'proto-professional' role in a classroom setting, more or less seamlessly, while participating in each of these roles through typifications such as classroom lecture, group communication, and design activities.

Method

This data for this study was generated *in situ* at a large Midwestern US university in a graduate-level introductory human-computer interaction course, taught with a design emphasis. The focus of this study is a portion of the formal student presentations and critique of work for a final project, which students prepared in teams. The course was held in a versatile multimedia classroom, with eight sets of tables and eight screens surrounding a central presentation stand (Figure 1).

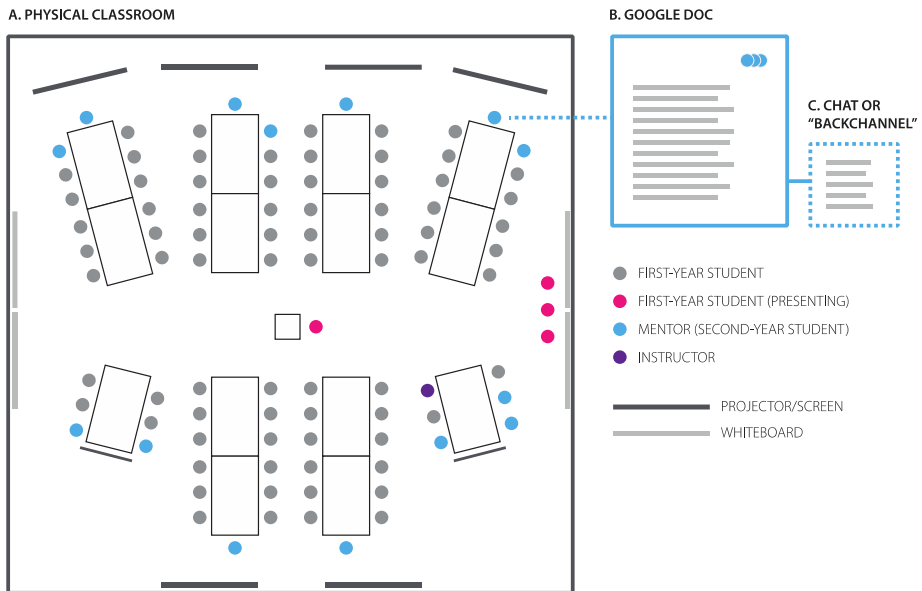


Figure 1 Arrangement of the physical classroom space (A), collaborative Google Doc (B), and backchannel chat within the Google Doc (C).

Participants

Three classes of participants created the data we used in this study. 1) first-year students, who were enrolled in the course; 2) second-year students, who volunteered as peer mentors for the first-year students, and were present for all class sessions and presentations/critiques; and 3) the instructor of the course. Presenting first year students (Figure 1, magenta) used slides projected to multiple screens around the room. Other first year students (gray) and the instructor (purple) looked on during the talks and subsequent critique sessions; the mentors sat around the perimeter of the room (blue dots). First-year students enrolled in the course did not have previous experience giving or receiving critique, and no formal instruction was provided in terms of the structure or expectations of the crit—through technological or physical modes. Second-year students functioning as mentors had a similar lack of direct instruction with regard to critique, but had learned the socialized expectations of critique within this educational environment, as they had experienced the same activities their previous year (e.g., Gray, 2013). It is important to note that the model of critique documented in this study was created in an ad hoc manner by mentors to address a ‘documentation gap’ between critique that occurred in the physical space, and the inability of the first-year student teams to document that critique

in real time; thus, this is an intact, yet student-generated instructional design for critique, intended to address a concern germane to the student experience.

Data Sources

In conjunction with the multiple classes of participants, there were several communication streams, not all of which were available to all participants. We will utilize four primary sources in this paper, reconstructed from digital documents and audio recordings: 1) a public presentation and oral critique [CL]; 2) the presentation document used by the student team; 3) a critique document collaboratively authored in Google Docs by second-year mentors [GD]; and 4) backchannel chat by second-year mentors in the Google Doc [BC]. CL and the presentation materials were available to all participants in the space, while GD and BC were only available to the second-year students and researcher, who were logged into the Google Doc. An edited version of the GD was provided to the student team after the presentation concluded. A summary of all verbal and virtual communication within these modes and classes of participants is included in Figure 2.

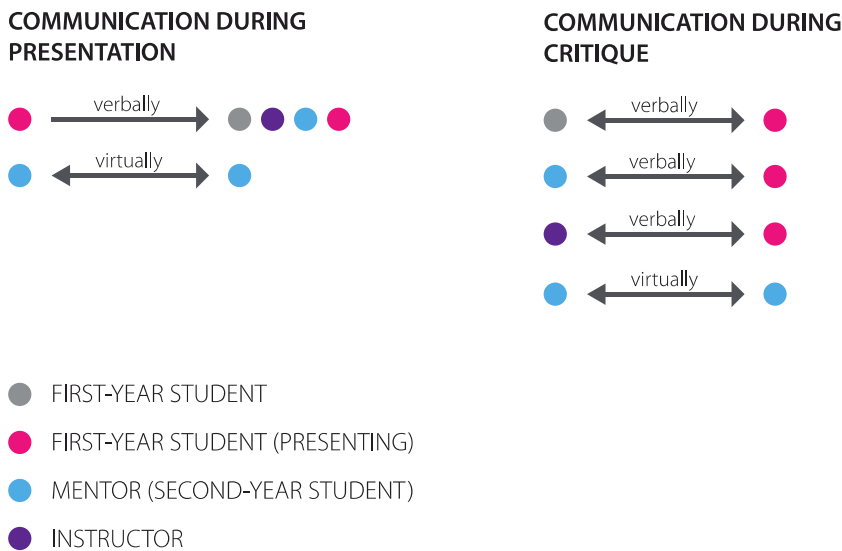


Figure 2 Communication channels present during the multimodal critique session.

Analysis

To facilitate analysis, each data source was digitized and sequenced using digital timestamps and verifications from the timestamped audio recording. Segments of the audio recording that included the student presentation and critique were transcribed for three teams, while the GD and BC was recovered from revision history and saved transcripts, respectively. These three teams were selected to represent a diverse sample of cases out of the 11 total teams, with a range of critique lengths, use of the BC and GD modes for communication, and the placement of critique sessions across multiple class periods.

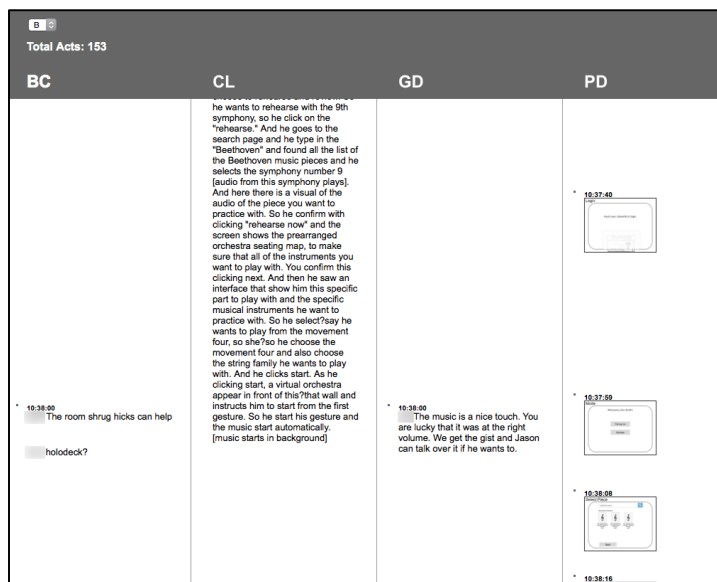


Figure 3 Example output of the simultaneous conversation streams for Team B in a web browser. Columns identify modes.

These sources were then visually compiled and organized using a web application. The resulting browser-based display allowed all sources to be 'read' horizontally, organized according to timestamps, with the vertical scrolling dimension representing time (Figure 3). We used this data visualization to identify clusters of communication, or locations in the transcripts where participants were communicating across multiple modes.

Results

We will briefly summarize the characteristics of the discourse, then provide several worked examples from the three cases to demonstrate how the patterns of discourse across multiple communicative modes related to the mentors' understanding and performance of typifications within a student and proto-professional role.

Socio-Technical Context of the CMC spaces

Any study of communication taking place in mediated environments should consider the socio-technical context of those communications because media configurations interact with social factors to impact how technologies are used. For example, email can be used more like instant messaging when organizing informal groups on short notice (Howard, 2012), or discourse via editable web pages (e.g., wikis) can be more akin to the communication involved in academic publishing (Emigh & Herring, 2005). The combination of power dynamics, media design, and topics discussed creates the socio-technical context (Bijker, 1991).

As the student mentors were more advanced learners and offering critique in a role somewhere between that of an instructor and that of a peer, we expected their interactions in the collaborative document to be longer and more formal. Analyses of averages of words per turn (Table 1) showed participation was more akin to discussion forum message lengths than one might find on other collaborative spaces (Howard, 2012). The collaborative document was not heavily edited. It functioned more as a means to

provide summative commentary than as a true place for polished communication. Similar to other studies of backchannel discourse in the service of a more public document (Abdul-Mageed, 2009), the characteristics of complexity and register, as suggested by relatively high averages of words per turn in the GD as opposed to the BC, evidenced that the two spaces differed dramatically in how they were used. In the GD, mentors focused their participation on providing feedback to those being critiqued and did not veer off on tangents.

Table 1 Characteristics of the discourse by team and data source.

Team Critique	Collaborative Google Doc (GD)			Backchannel (Google Doc chat)		
	# Turns	Average Words per turn (SD)	Total words	# Turns	Average Words per turn (SD)	Total words
Team A	37	46.4054 (45.6369)	1717	13	5.1538 (4.4695)	67
Team B	26	25.8462 (21.6079)	672	69	7.3043 (5.7441)	504
Team C	38	37.1579 (28.9496)	1412	135	7.1852 (6.6968)	970
TOTAL	101	37.6337 (35.5321)	3801	217	7.1014 (6.3113)	1541

In the BC, mentors interacted with only themselves and this allowed for playful, less formal interactions. As expected from the social context of peers crafting critique in a non-persistent and synchronous media, average word lengths were lower in the BC, 4.1940 (SD=1.4073) characters per word as compared to 4.4096 (SD=0.5901) in the GD. As a benchmark, typical synchronous communication (i.e., chat) generally falls between 3 and 4 characters per word, while formal academic discourse ranges from 5 to 6.5 characters per word. The topics revolved around the artifacts being presented by the first year students, but phatic communications and tangents occasionally appeared in the space, such as references to inside jokes. While the turns in the GD remained relatively constant, mentors used the BC progressively more (yet still sporadically) over the course of the activity. This suggests the mentors were learning the affordances of the media, and evolving their use of those affordances as they interacted.

Team A

This team was the second to present on the first day of critiques for this project. While the mentors had produced collaborative critique documents in previous projects, this was the first instance where the mentors made use of the chat function available within the Google Doc environment, resulting in 13 BC conversational turns during the critique, along with 37 conversational turns in the main GD.

The student team, taking on the moniker of 'Team Ridiculous,' presented an immersive and intentionally reflective physical computing experience. This project made use of statues embedded on a college campus that could track body movement, and then display the resulting body data through visualizations, attempting to demonstrate how data might be mapped to experience in more meaningful ways (Figure 4). While the team's intention

was to draw attention to the gap between impersonal body data, captured through devices such as a FitBit (a fitness tracker worn on the wrist), and the experiences that result in the creation of that body data, the actual project produced by the team was criticized for its lack of depth and attention to basic principles of human-centered design.



Figure 4 Slides from the Team A presentation.

The mentors only used the BC in a very narrow slice of the critique (2 minutes out of almost 24 minutes), following the actual presentation by the student team. This use of the BC resulted from Team A's unique approach to accepting critique from first year students. Rather than following the typical pattern of listening to a critique, then responding with justification, research, or other forms of engagement, this team did not respond to each individual critique. Instead, they listened to the first year critique while taking notes (Figure 5), then thanked the individual and went on to the next question.



Figure 5 Team A taking notes as the critique progressed.

This strategy prompted the first BC comment at 9:34AM, around three minutes into the critique, by BV: 'Why are they not responding to critique?'. This query resulted in a brief, yet active conversation on the BC, with multiple mentors concluding that the team wanted the most critique possible, although this strategy grew early criticism from the mentors, with an underlying feeling that they couldn't actually support their design or address many of the critiques that emerged.

BC [9:34]

BV: Why are they not responding to critique?

BC [9:35]

RO: no clue maybe trying to get the most critique?

RK: I susepect they just want more to write down

BQ: i think to get more comments in

RK: LOL SUSEPECT

UD: thats fine.

RI: That was my thought. (+BQ)

BV: But I feel like they have no meat behind all of this—leaving too many unanswered questions

RO: yeah

RK: agreed

BQ: it flopped :(

RI: I agree. It's they're funeral

RO: awe

While the BC functioned primarily as a way for the mentors to work out their confusion about the social dimension of the critique that was unfolding before them, the GD was where the majority of the critique was formed. In total, 37 critique statements were added to the document, 8 of which represented documentation of first year critiques in the physical classroom space, added to the document by one or two mentors. Similarly, the instructor's comments and the elected mentor's comments were summarized and added to the GD. At 9:40AM, one of the mentors added one of the more substantially annotated statements to the document. This comment was less directed than many added to the GD, pointing out the lack of cohesion on the project level, with the question by RK: 'What is your core?'. The concept of the *core* was used in this class to define a problem space— inclusive of a problem statement, user group, and potential solution space. This idea of the core was so socialized among the instructor and students, that it was common for students to be expected to memorize and be able to verbalize their core during a presentation or critique. So this statement by the mentors was especially damning, pointing out the lack of substance in the team's presentation, and the general lack of research on which the design rested.

GD [9:40]

RK: What is your core? (BQ +infinity)(+1 TA) (+Zen Dog) (+1 UD, +1 VE) (+1 NI, addendum: I just completely don't get it, the entire project doesn't make sense to me anymore) Remember the RESEARCH!!! (especially if you are aiming for CHI) (+500000 RK)

This particular comment in the GD also received a large amount of annotations—the most of any GD comment we found in this study—while also being increased in size relative to the other comments, with bold styling applied. The range of annotations included unusual extensions to the '+1' concept, ranging from the absurd (e.g., '+infinity' or '+500000') to the inspirational (e.g., '+Zen Dog'). This latter annotation made reference to the course mascot, put in place by the instructor; this mascot, pictured in cartoon fashion floating down a river in course materials, epitomized what it meant to take in the educational

experience without struggle—that it was all about the ‘glory of the ride,’ not success in traditional academic terms.

The structure of the critique, as it played out in the physical classroom space, was largely determined by the interactions between the presenting team and first year students. While mentors discussed the critique in the GD and BC spaces, this critique only broke through the ‘fourth wall’ when an elected representative from the mentors gave a summary critique—bridging the critiques contained in the virtual space and bringing the summary into the physical space for everyone to hear. The mentor that delivered this physical critique seems to have been somewhat self-selected, since there was no explicit conversation in the BC or GD selecting him, although other modes of communication not captured in this study (e.g., SMS, Facebook) may have been used.

CL [9:48]

NI: This is not _____. So, we’ve been talking, we’ve been talking in our doc. And, we kinda wanna, I have been elected as it were, [laugh] because it is kinda harsh. We don’t—we lost your core. We have no idea what your project is about anymore. We can’t figure it out. We just don’t get it. We don’t see the core anymore. And your presentation has almost no rationale or research to get us on board with what you’re doing. We don’t know why these things exist, what’s motivating them, what the point it, or why we should know more about it. Um, [long pause].

NI was known as one of the most blunt and harsh critics among the mentors, and this reputation seems to have been reinforced when he stood to give his critique in the classroom, being met by nervous laughter. He expanded on the lack of clarity and unpreparedness referenced in the BC, as well as the damning lack of a core, showing an almost brutal ambivalence to the team—‘we have no idea what your project is about anymore.’ While this statement was, ostensibly, more diplomatic than some of the more playful and earlier manifestations of the critique, as present in the BC and GD, all of the elements remained the same—the lack of research, lack of an understandable core, and ultimately, a lack of cohesion to the project at large. While the content of the mentors’ critique remained consistent from BC to GD, and then to the physical space, the register employed by the interlocutors changed dramatically, from informal to formal.

Team B

Team B presented on the second presentation day, and was the final team to present. Over time, the presentation times had remained relatively stable at around seven minutes, with the critique portion getting gradually shorter (only 12 minutes for this team, compared to teams A and C, which were over 20 minutes each). By this point, the mentors’ use of Google Docs and the BC had stabilized, resulting in 69 BC comments and 26 entries to the main GD.

The student team presented their vision of an immersive coaching and practice environment for conducting students. This project was centered on a circular screen that projected a virtual orchestra, with a central digital podium that allowed the conductor to control the music being played, and displayed the musical score (Figure 6). The team’s intention was to create an experience that could allow a conductor-in-training to practice their skills without requiring the complexity of a full live orchestra or only the imagination

of the student. Their design took into account common gestures that conductors use to control speed, volume, or other aspects of the performance, and was generally well-received by the mentors, with special note of their extensive research in which the design was grounded.

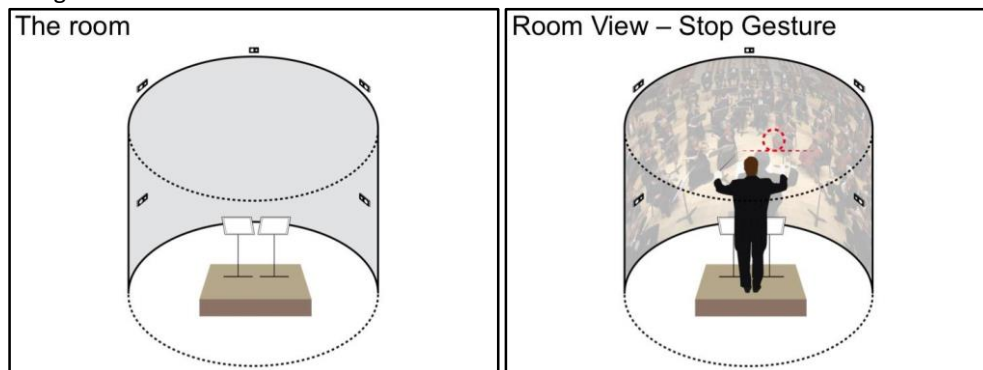


Figure 6 Slides from the Team B presentation.



Figure 7 Team B presenting insights from their research.

Unlike the early and limited use of BC in Team A, during team B's presentation the BC was a vital part of the conversation—both during the presentation and critique. The first use of BC started around three minutes into the almost nine minute presentation, and continued through the end of the critique. While the mentors initially used the BC to comment on the 'holodeck'-like qualities of the immersive conducting environment, analogizing the design in a collaborative way, the most interesting uses of this mode were in the construction of critique and affirmation of first-year students during the critique. One particularly impactful moment in the BC occurred early in the critique, when the presenting team was asked: 'Just wondering why you chose to do a school-based room rather than an at home system?'. One of the presenting students responded: 'Cause we have done some research about the practicing habits of the conductors, and they are already practicing there...', providing details from their primary research. While this student was still responding, the affirmation of this strategy—answering a critique with research—resounded in the BC,

with TL remarking ‘BOOM what an answer,’ and another mentor, SJ, casually remarking, ‘yea that was clutch.’

BC [10:44]

TL: BOOM what an answer. Nice, [male first year presenter]

BV: They may be the best response to a critique yet

TL: Dude, right? ‘We did some research that showed...’

SJ: yea that was clutch

RI: Overall, this is one of the best projects for sure

RO: yes. Agreed

SJ: yea so much great primary, so much CHI potential, especially if they can evaluate and iterate

[10:45]

BV: Whoever talks please say how they own their space

TL: much CHI, so wow.

RI: Totally agree. These guys should go to CHI

BV: ok who gets to dole out all this praise? SJ?

RO: +1 for SJ

[...]

[10:47]

SK: let [first year presenter] know that he just gave great answer

This affirmation was then extended to the entire team, with mentors pointing out in the BC how this research—raised by one of the presenters—was a positive commentary on the larger project. RI remarked that this was one of the better projects they had seen, and SJ agreed, expanding his former, more casual affirmation, with an affirmation of the project’s potential at CHI, if the team extended their evaluation of the design solution. They then used the BC to plan out who will present the mentor’s comments, voting up SJ, who had already been immersed in the conversation, and had previously served as this team’s mentor. Interestingly, while planning what summary critique SJ will deliver, SK reminds the mentors to explicitly recognize the presenting student whose response they earlier affirmed.

The use of the GD to formalize critique, and its connection to the conversation occurring in the BC, was more evident in this case than in Team A. In total, 26 critique statements were added to the GD, 3 of which represented documentation of first year critiques in the physical space. In this case, the instructor’s comments were summarized in the GD, but not the summary statement provided in the physical space by SJ. The active interplay between the BC and GD—an evolution from the relatively siloed uses of these two modes in earlier cases (e.g., Team A)—is clear in the rapid documentation of key BC themes, which are parsed and translated into more formalized critique feedback through the GD. We can see how two participants in the BC (RO and BV) are actively participating in both modes: first documenting their feelings in the live BC mode, and then creating a more formal statement of that sentiment that will eventually be shared with the presenting team.

GD [10:44]

RO: Awesome answer to [first year critic] Question [male first year presenter]! (+1 SK

+1 TL) Grounded in research and supports your rationale.

BV: Your response to [first year critic] critique let's me know that you are not too locked in. YOU own your space

In the example above, RO interprets the BC conversation, affirming the male first year presenter, and repeating the successful rhetorical strategy of grounding a critique response in research; this is not merely a retelling of her BC statement, which was only a token agreement to the comments of others, but rather a synthesis of multiple BC comments. Similarly, BV expands on his BC statements about the presenting team 'own[ing] their space,' turning the positive sentiment into a recognition of their flexibility as a team. A subset of the mentors also documented the first year comments, but not in a completely consistent manner. For example, one first year student suggested adding a gamified aspect to the design, and after rejection by the mentors in the BC, this suggestion did not appear in the GD. Only three student critiques were documented in the GD of the seven comments that were given in the physical classroom.

The mentor's critique entered the physical classroom space near the conclusion of the critique period, with a planned summary statement by SJ. As noted previously, this particular mentor was elected through suggestions by other mentors in the BC, which then proceeded to a consensus, which SJ accepted. More so in this summary critique than any other, we can trace the construction of the critique in the physical space from multiple statements in the GD. The positive tenor, the affirmation of their thorough preparation, and the group's performance in delivering the design to the audience are all components of the verbal comment in the physical space that initially emerged in the virtual space.

CL [10:50]

SJ: My first—first of all, I wasn't your mentor for the first part of this project, and what you guys have done with this is just great. It really shows how it makes a difference when you ask people and see what they go through and learn sort of how you can design for them. We learned a lot about the problem space, and I didn't know a lot, but you guys taught us, and that was really cool. You showed how—how much you know about your space. And more to that the way you responded to critique is really great. Especially where [male first year presenter] responded to 'why not a ____' shows you know how to constrain your design and useful. And [female first year presenter], backing up your ____—responding to the critique with actual primary research is always a good thing, and it's so valuable to have that in your back pocket. ____ we talked to users and this is how they felt. So awesome, awesome job on critiquing—on responding to critique. [...]

SJ proffers an overwhelmingly positive critique, affirming two of the presenters who had used research to support their design claims and approach, one of which is documented above. It is notable that, in this affirmation, SJ—and the mentors at large that helped to construct the critique—go beyond merely congratulating the presenting students, also using this as an opportunistic teaching moment for all students, using the critique everyone just witnessed as a situated example. This opportunistic teaching, as in the previous versions discussed in the BC and GD, displays the rhetorical strategy that the mentors want to emphasize: 'responding to the critique with actual primary research is

always a good thing, and it's so valuable to have that in your back pocket.' It is notable that this expression is more directed in a pedagogical way—referencing the class at large, not just the presenting students.

Overall, in this case we see suggestions being brokered in the BC in an immediate, experiential framing, documented in the GD in a more independent form, and then being offered up in the physical space by the mentor at the conclusion in an explicitly instructional way. The versions of the comments toward the presenting first year male shows a development of the same concept in different socio-technical manifestations, with increasing levels of formality and instructor-like tone as the register changes.

Team C

This team immediately followed Team A on the first day of project critiques. Although the BC had only been initiated as a mode of communication among the mentors for the previous team, the use of BC substantially increased—from 13 conversational turns in Team A to 135 turns for Team C, the most of any team. In addition, 38 conversational turns occurred in the GD.

The student team presented their reimagining of a movie theater experience, using immersion through virtual reality glasses and other various technologies to engage moviegoers from the moment they purchase their tickets. This process began with the introduction of a virtual character that oriented the moviegoer to the experience as it unfolded, a defamiliarization process as they moved towards the proper theater—moving from physical reality to virtual reality—and then a collaborative play experience that led up to the actual watching of the movie (Figure 8). While the design relied upon several key technologies, such as VR glasses, perceptual cameras, and haptic displays, the implementation of these technologies was not made clear until the end of the presentation, causing confusion among the mentors.



Figure 8 Slides from the Team C presentation.



Figure 9 Team C presenting the introduction to their immersive theater experience design.

Unlike the limited use of BC in Team A, the mentors extensively used this mode to communicate about their perceptions and experiences of the physical classroom interactions. And unlike the more balanced use of BC across the presentation and critique in Team B (which occurred on a later day), the BC was silent during the presentation and only began as the critique portion commenced. The BC came to life with a discussion about what the focus of the team's presentation was, or the contents of their core. But then the conversation in this mode quickly turned to the structure of their presentation, which one mentor described as 'ass backwards,' leading to a consensus among the mentors that the technologies that made the design possible should have been explained up front. This confusion came to a head at 10:06AM, around two minutes into the critique portion, when RK disagreed with another mentor who had claimed the presentation was 'stellar,' even though it was backwards. RK called out the confusion many of the mentors had been feeling during the presentation in a brutally honest way: 'I kept thinking NO FUCKING WAY. WTF ARE YOU GUYS DOING ARE OYU ON CRACK?'.

BC [10:06]

RK: unfortunately I don't think it was stellar because since it was backwards, the whole time I kept thinking NO FUCKING WAY. WTF ARE YOU GUYS DOING ARE OYU ON CRACK?

BQ: agreed if they had clarified how this happens at the moment, i would have listened more

NI: I wouldn't say backwards, necessarily, I think it would have been possible to tell that story while interspersing some of this argumentation so that it's not all one thing then all the other.

RI: It is a very... psychedelic experience

Following this profanity-laced tirade from RK, other mentors concurred with the overall sentiment—that they weren't sure about how the design would be implemented, and thus didn't take it as seriously in the moment. Interestingly, TL, who went on to eventually give the mentor summary in the physical classroom space, was not present in this more intense portion of the BC, although, when a mentor asked for volunteers later on in this mode, TL agreed to take on that responsibility, saying simply 'I have things to say.'

Similar to Team B, the primary function of the GD was to formalize critique, although due to the late entry of BC communication—after the presentation had already concluded—the GD also included documentation of questions that were more consistent with the ‘in-the-moment’ character of the other BC turns. One of RK’s early contributions to the GD came in the middle of the presentation at 9:59AM, when she questioned: ‘How does the texture change to wood? Is your design to give people acid?’. At 10:04 TL locates a link documenting the kind of behavior the team had been describing, adding an annotation: ‘Oh shit it’s real’ followed by the link to the evidence that the technology under discussion actually exists. Later that minute, RK adds in an additional comment, explaining that she wishes the team would have mentioned this technological basis for their design earlier. A similar exchange occurred at 10:03AM on another comment authored by BV, noting that the one technology the team had talked about (perceptual cameras) don’t provide the affordance of touch; after the team introduces two other technologies by name (i.e., Revel and Aireal), a query by RK prompts RO to do a search and paste in the related web link.

GD [9:59]

RK: How does the texture change to wood? Is your design to give people acid? (+1 TL +1 BV) (Oh shit, it’s real! <http://www.disneyresearch.com/project/revel-programming-the-sense-of-touch/> TL) (RK: I wish you guys would have said this before. The whole time I kept thinking about how impossible this was going to be, and honestly it detracted from the presentation for me. I have never heard of these things.)

[...]

[10:03]

BV: Perceptual cameras do not offer resistance for me to actually feel. And that is a ton of tech I have never heard of needs some deeper explanation. (+1 TA too much hand waving is bad? the next step after designing is implementation, how are you going to do it..)

RK: What are Revel and Aireal?

[GD comment, 10:04] RO: disney experience tech

[GD comment, 10:04] RK: Did they say that?

[GD comment, 10:04] RO: nope <http://www.disneyresearch.com/research-areas/human-computer-interaction>

[...]

[10:06]

TL: I think the ‘presentation preview’ slide at the beginning was brilliant. You could have very easily leveraged this to better include your research early on. Make your research the equivalent of the ‘turn off your cell phones’ announcement. Whatever it may be, but briefly explaining that ‘the tech you are about to see is fantastical, but be assured - it is feasible.’ (RK: super awesome wicked great suggestion)

At 10:06AM, TL offers a specific suggestion to implement an earlier discussion of the technologies, or at the very least, to limit the amount of potential confusion about the feasibility of the project, substantially sanitized from its first appearance in RK’s BC comment. In this case, the conversation in the GD and BC has moved beyond the existence of the technology to support the interactions the team had described, instead addressing

how the team could restructure their presentation to address the confusion the mentors had experienced.

As TL's critique entered the physical studio space, he explicitly drew on a synthesis of his own comments in the GD, alongside that of other mentors. As with TL's sanitization of themes present in the BC and interpreted or expanded in the GD, his physical presentation of the critique was similarly diplomatic and professional. He presented two main themes: the first dealing with the link between the team's project and the required body data element, and the second paralleling the conversation followed in this case, regarding the lack of technological scaffolding in the presentation. A portion of TL's summary is provided below.

CL [10:19]

TL: [...] And then also, the second critique is more of a presentation structure. You chose to have the technology explanation at the end. And—which that's definitely one way to do it. But I know for a lot of mentors, what we experienced was, when you started describing like touching the walls and feeling things, like at that point, one of the comments like was are you giving ____ before they walk in? [laughter] And to me, and to several others, that sort of discredited the rest of the presentation because we just had no idea how that was even possible. And when you mention that and you look it up, it's very clearly possible and it's definitely something worth pursuing. [...]

TL links his critique to the experience he and his fellow mentors had in the BC while watching the presentation, but his narrative is non-descript and professional, never indicating the strong reactions that were initially shared between the mentors. This shift in register, then, characterizes the transitions the mentors appear to make when bridging between modes of communication—offering the same substance of critique, but in a different packaging.

In this case as a whole, we see the strongest and most varied examples of language across all of the cases—with the concept behind a profanity-laden statement being gradually distilled through mentor communication, and then being presented in a formal, professional way in the physical classroom space. It is notable that females are the primary drivers in this conversation—, from RK's early instance of profanity to RO's locating the technology links to further the conversation about feasibility in the Google Doc—moving the conversation from raw experience to distillation of critique.

Discussion

Emergent Typifications

Within their role as mentors, the advanced students performed typifications in each mode that characterized their shared understanding of appropriate register, level of professionalism, and presence of instructional or pedagogical purpose of the activity.

Meaning reconstruction techniques (e.g., sequence analysis, as explored above) function within a critical mode, and allowed us to reconstruct the instructional process through the student perspective, including the roles students took on, and the typifications that were consistent within discrete portions of those roles, as performed in the classroom setting. In doing so we found these advanced learners performed typifications on a continuum from formal instructional tutor in the physical mode to relaxed professional in the Google Doc

messaging mode (Figure 10). Each of these typifications is valuable in understanding how the technology shaped the critique that was offered through particular mappings of communicative and technological affordances.



Figure 10 Comparison of mentor typifications taken on in the physical and virtual spaces.

In the virtual BC space, we observed the most informal mentor communication—with an often even mixture of social talk and substantive commentary. This *relaxed professional* communicated about aspects of the design, presentation, or content of critique that would be expected from a design professional, but with a decided slant towards informality, and occasionally, even crudeness. This typification was characterized by rapid, and often misspelled conversational turns; the rough equivalent of a real-time Twitter stream of the presentation and critique activities.

The virtual GD space, by contrast, was much more organized, and a certain heightened formality that likely benefitted from that organization, resulting in a *poised professional* typification being taken on by the mentors. While the BC conversation was somewhat disposable and transient by its very nature (chat is erased when the document is closed), mentors were aware that the final GD—or at least a copy of it—would be provided to the presenting team as a record for future project iterations. The poised professional typification aligns not only with the structure and values expressed in the space (e.g.: accountability, accurate documentation, discourse of higher complexity) but also in the attitude expressed in the GD. Comments contained oblique references to inside jokes or other humor, and demonstrated how the mentors would likely interact with other professionals in the industry. In addition, the mentors proved their orientation towards practice through their general desire to document all feedback, regardless of source.

Finally, in the physical classroom space, the second year mentors took on a more explicit *instructional tutor* typification, consistent with their academic surroundings. Unlike the GD, where mentors offered critique in an egalitarian framing, not using their power over the first year students as a way to legitimate their suggestions or criticisms, the mentor summaries in the physical space took on a much more serious, often evaluative or instructional tone; the content of the critique used linguistic routines that were remarkably similar to the instructor's critique. Summaries couched criticism within affirmations of achievement, but were careful to direct learners' attention to areas to be improved. In this sense, the instructional tutor typification in the physical space resulted in a strengthening of the already existing instructional fabric of the course, not a repositioning of the space as a professional, career-directed space.

Role of Students in the Crit

The interactions among the mentors, communicating across multiple virtual and physical spaces in sophisticated ways, expands not only what is possible to achieve in a critique, but also underscores that students can play an active role in that critique, shaping their future abilities as a professional designer. The mentors' intermediate level of expertise appears to

not only result in relevant, insightful critique that augments the traditional instructor critique, but also allows these students to perform a proto-professional identity, expanding their own design expertise in the process. This multimodal critique design provides channels for interaction and learning during presentations and shows how learner engagement might be productively increased within the time and physical constraints of the critique. This leads us to conjecture that the social nature of talk, particularly in the BC, may be a foundational aspect of designerly talk; that the initial seeds of complex ideas find their beginnings in the rich soil of phatic, though collegial, informal chatter.

In addition to the learning opportunities afforded to the advanced students in the mentor role, the multimodal critique also increases our understanding of how students view ownership and accountability in technological spaces where anonymity might present challenges. While previous cohorts of mentors had provided anonymous critique documents using the same overall technological infrastructure, this cohort felt that appending initials to each statement provided a sense of ownership, giving first-year students a way to trace who said what, in contrast to the previous iteration where identities were not disclosed, which occasionally led to harsh and less productive critiques. While this technological overlay for the critique process capitalized on the mentor role in the classroom, potential concerns on a curricular level also emerged in our reflections on the instructional design. Some instructors may place a value on the unsanitized interactions we captured, and want them to be shared in their original form—an often brutal honesty that is consistent with the traditional design critique (e.g., Anthony, 1991; Webster, 2006). In reconstructing the perspective of the mentors, it seems unlikely that these unsanitized interactions would be documented (or even produced) if learners knew their interactions would be shared. While the media configuration we observed may afford the production of harsh, anonymous criticism, it simultaneously creates an ethical dynamic where the mentors self-moderated the level at which harsh criticism should not be shared, and the level of anonymity that was appropriate given the known position of power the mentors occupied. The digital critique space may also tacitly encouraged mentors to avoid giving critique directly to a student team, as was evidenced by the voting process to identify a mentor willing to give a critique summary in the physical space. In recognizing these potential negative consequences of the multimodal critical performance, we emphasize that this study does not advocate for the pedagogical practice, but rather documents the complexity of such performances—through the language of roles and typifications taken on by students— should an instructor elect to employ the design.

Conclusion

In this study, we have documented a unique instructional approach to critique, with experienced students using common technological tools to scaffold the critique process. Rather than a direct, purely physical or purely digital critique, as other literature has addressed in the past, we have shown how a multimodal approach to critique in an existing classroom context extended the reach of experienced students, augmented their own learning experience and the experience of beginning learners, and also extended the reach of the critique into a space defined by its professional communicative qualities. This study, including the documentation of roles and typifications that experienced students are able to take on, is highly suggestive for future student-centered implementations of design pedagogy. In particular, the complex patterns of communication between mentors—

reconciling both professional concerns about quality of presentation and product, and the instructional scaffolding needed to encourage further growth of less experienced students—outline an exciting space for further inquiry.

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