A Cross-Case Analysis of Disciplinary Identities Communicated Through Design Reviews

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Abstract
In post-secondary educational settings, discourse is a mechanism by which students develop occupational identities as they engage in a particular community that communicates attributes of their prospective profession. This study focuses on revealing disciplinary identities and how they are conveyed and negotiated during interactions between design students and project reviewers. We draw upon Gee's identity framework and focus on the enactments of disciplinary identity in three different disciplinary settings: choreography, industrial design, and mechanical engineering. A cross-case analysis indicated differences that were epistemological (e.g., subjectivity of reviews) and similarities in ways instructors modeled institutional identities. The results have implications for interdisciplinary activities and suggest that disciplines that engage in design have much to learn from one another.

Keywords: choreography, design reviews, disciplinary identity, industrial design, mechanical engineering

1. Introduction

Design is a process that is common to a diverse array of disciplines (Bucciarelli, 1994; Maaike Kleinsmann, Buijs, & Valkenburg, 2010; Kleinsmann & Valkenburg, 2008). Although specific disciplines have their own unique ways of representing, interacting with, and communicating design problems and solutions; understanding the disciplinary commonalities and differences within a design framework, can inform teaching and learning in these diverse disciplines. Moreover, many of those who engage in design needs to be able to cut across disciplinary boundaries. Hence, examining design process from an institutional identity framework would fill

an important gap in design research. We focused on revealing how design reviews (structures, interactions, modalities, etc.) embody particular design beliefs and values, and the ways students and coaches perform design identities within institutional structures. These analyses addressed the following research questions: (1) How are disciplinary identities conveyed and negotiated during design reviews through the interactions between design students and project reviewers? (2) How do disciplinary identities communicated during design reviews differ between mechanical engineering, industrial design, and choreography?

2. Theoretical Framework

James Gee's (2000) identity lens serves as the basis of the theoretical framework that guided the analysis. Gee describes a network of four identities (natural, discursive, institutional, and affinity) that both shape and are shaped by diverse elements such as actions, values, speech, expressions, dress, and objects used. In this study, we focused on institutional identity (I-identity) in specific, while acknowledging that individuals connect with all four of these identities in complex ways.

A focus on I-identity in analyzing design reviews is appropriate and effective as I-identity is linked to the role one plays in an organization or in society (Gee, 2000).The design reviews characterize and communicate the valued aspects of a profession through their evaluative nature. In addition, the institutional identity can represent a broad disciplinary identity such as engineering (Downey & Lucena, 2004) or a more specific identity linked to a company or school (Paretti & McNair, 2012); hence, applicable to the study of disciplinary identities we have attempted to explore. Prior studies that use Gee's framework in design education demonstrate disciplinary consistencies as well as differences between disciplines (Kittleson & Southerland, 2004; Paretti & McNair, 2012).

Another aspect of design reviews is the richness of discourse. Gee (2000) emphasizes that identity can best be seen through understanding of macro- and micro-level discourses or, "Discourse" and "discourse." Big "D" discourse refers to the way of being for which an individual is recognized as belonging to an identity (Gee, 2000, pg. 110). Little "d" discourse refers to how identity is negotiated, sustained, and recognized. The broader themes in Discourse related to who and what institution (e.g., members of an elite group) are constructing the identity, while discourse focuses on the mechanism by which identities are enacted (i.e., conversations between the students and reviewers). Building on Gee's framework, we examined disciplinary differences and similarities that become apparent during design reviews.

3. Methods

3.1. Context

We explored institutional identity during design review sessions that occurred in three disciplinary contexts: choreography, industrial design (ID), and mechanical engineering (ME). We selected these groups because each represents a chance for project reviewers to provide feedback before a more formal presentation and thus establishes a natural representation of the discipline compared to formal student presentations (Adams & Siddiqui, 2013).

Mechanical Engineering
The context of Mechanical Engineering was a semester-long capstone design course offered to undergraduate students in their final year of their program. Students worked in three teams of three or four members: Prop Team, Robot Fish Team, and Cap Team. All three teams worked on robotics projects but specific design goals were different. Prop Team designed a portable, self-propelled tow bar that could pull light aircraft short distances over the ground. Robot Fish Team designed an underwater robot. Cap Team designed a robot but it was not functional. Successful teams were selected to compete for a mechanical engineering design award.

Industrial Design
The context of industrial design was a semester long design course for undergraduate students in their third year of a four year program. The design project was client-inspired and required the design of a chair. Following the review process, students prepared for final presentations during which the client would select one or more students for a design award and summer internship. Students worked individually and met individually with the instructor to discuss the full-scale mock-ups or "look like" models they would use in the final presentation to stakeholders. The length of these presentations ranged from 9 to 20 minutes.

Choreography
The context of choreography was a semester-long course dedicated to the creation of an original choreographed dance piece. This choreography was then to be culminating in a public dance performance. Two students, both with dance minors, and five instructors with various degrees in dance contributed a piece to the performance and were included in the dataset.

3.2. Data Analysis

A cross-cultural discourse analysis approach was used to investigate disciplinary identity. This method involved a cross-case analysis of discourse to investigate differences across disciplines. Each transcript was analyzed by three researchers with attention to Discourse categories of

speech, actions, attire, use of artifacts, gestures, and feelings/values/beliefs (Gee, 2000, 2011). The analysis also included descriptions of the environment reflecting elements of institutional identity such as the room arrangement, project structure, and dress code. The analysis started with a within-case analysis focusing on institutional identity in each discipline. Three researchers individually summarized aspects of each institutional identity they have identified. Next, a cross-case analysis was used to compare identity across disciplines. We used this analysis to develop themes based on each discipline as well as to make comparisons between disciplines.

4. Results and Discussion

4.1. Aspects of disciplinary identity conveyed during design reviews

The members of the discipline, especially the instructors, represented and communicated institutional identities through speech, actions, gestures, values, attire, use of artifacts, and environment (See Table 1). Each discipline interpreted design and conveyed their identity in their own unique ways which provided us with evidence for articulating their institutional identities. These differences were found in relationship to the following four questions about each discipline:

- Who are designers in this discipline? What are their personal attributes?
- Who does their design serve? Who is influenced by the design outcome?
- What are aspects of good design?
- What are components of the design process?

Theme #1. Who are designers in this discipline?
Choreography
In choreography, the design reviews focused on individuality and emphasized individuals who can think outside-of-the-box. Instructors emphasized elements of the choreographed dances that were "surprising" and "unique" and devalued elements that were "trite".

Designers, thus, needed to be artistically creative in order to develop such routines in all aspects such as dance moves, dancer's emotion, clothing, posture, and gestures. The design reviewers repeatedly communicated these aspects as illustrated in the following excerpts. In first quote, Rachel praises Elena for her originality. In the second quote, Claire encourages Anita to demonstrate more originality.

> *Rachel*: It's a weird little piece. It's like this is a weird little piece---you know, in
>   a good way, like it doesn't follow a lot of norms and so I appreciate that.
> ......
>
> *Claire*: It's the partner leap. I would love for you to find something more original
>   than that. I feel everything else is but that is kind of a standard.

Table 1. Comparison of institutional identities

Identity Aspect	Choreography	Industrial Design	Mechanical Engineering
Speech	• "I" language • Most speech directed at student from instructor • Positive • Emotive and descriptive language	• "They" language • Conversational and interactive • Encouraging, expressing possible future challenges	• "We" language • Most speech directed from student group to instructor • Concise, direct and clear language
Actions	• Profuse, individual feedback	• Guides student to solution with questions • Instructor actively listens and provides specific suggestions	• Outlines specific expectations in list format
Gestures	• Emotive and demonstrative hand and arm gestures • Head nodding as others share opinions • Gestures illustrated moments in the dance that are difficult to conceptualize in words • Demonstrated how an element could be altered	• Limited hand gestures • Used to indicate elements of design	• Some hand gestures during speech
Values	• Multiple, diverse perspectives • Engagement and personal connection with audience • Originality and individuality • Intention/storyline evident in design	• Balancing designer's vision with client's input • Duality of form and function ("cosmetic" and "structural") • Time management and deadlines • Simplicity and neatness	• Emphasis on performance • Encourages efficient use of time • Well-thought out and clear rationale behind decisions • Uniform requirements for evaluating success (grading algorithm)
Attire	• Casual • Dark, muted colors	• Casual	• Casual
Use of Artifacts	• Paper and pencils for notetaking • Some instructors have laptops (not used for demonstrating dances)	• Dual-screen desktop computers • Sketches • Computer drawings • Miniature mockups of designs	• Video footage of design prototype in use • Prototype of design • Pen and paper for notetaking
Environment	• Circular arrangement of tables in a classroom-type setting • Comfortable • Personalized space	• One-on-one discussion in a crowded computer lab-type setting • Personalized space • Cluttered workspaces, chaotic and noisy	• Students positioned across work table from instructor in a lab-type setting • Sparse and drab space

The instructors also conveyed the importance of expression and emotion as an extension of this creative individuality. They described these traits in their discussions with the student designers, but also conveyed these traits in both their speech and gestures.

Industrial Design

The primary trait that was emphasized in industrial design was flexibility. This manifested in terms of balancing creative, user, and structural considerations during design; communicating the design to meet client requirements without compromising the design, design process, or designer's needs; and especially being open to design changes as necessary. In the following quote, Gary describes potential changes that might be necessary and commends Esther for including an element that allows flexibility in the design process.

> *Gary*: Well, you know, again, there, you could even maybe, maybe this inner – the inner piece could be out of, ah done out of a different material. Who knows? Maybe that since it's small, and maybe it could be a bent plywood or something. I don't know – what I like about this is you could change it out to different – potentially, to other materials and different combinations of materials.

Mechanical Engineering

The traits that were dominant in mechanical engineering was efficiency and clarity. Nelson both demonstrated and explicitly stated the traits of a good designer in his discipline: an engineer is efficient, professional, and clear. Nelson emphasized time management, redirected students' responses if they became unclear or off-topic, and in the following dialogue, directed students to be succinct and professional while remaining succinct and clear himself.

> *Nelson:* So these are the questions I want answered, and I want them to be succinct. Do you know what succinct means?
>
> *Matt:* Yeah.
>
> *Nelson:* Okay. One, I want to know if it is fully assembled.
>
> *Ellie:* We can stick a handle on it.
>
> *Nelson:* I'm gonna give you a few minutes to put this together. Two is if it is not fully assembled, what is not per print, and why.
>
> *Mark:* Okay. In that question, is it included did something change, but it's still assembled? Okay.
>
> *Nelson:* All right? Two, is it fully functional? If it is – 2A. If it's not fully functional, what is not functional, and why.
>
> *Mark:* Okay.
>
> *Ellie:* Functional compared to our design specifications.
>
> *Nelson:* Mission statement.

Ellie: Just the mission statement?

Nelson: Right. Three, what are your recommendations for fixing it, if you have any of those. I won't ask very many questions. If you were to run through this as professionally as you can, explaining answers to those points, I might ask a question or two, but not very many, okay? So I'm gonna give you about five minutes to put together your presentation.

Theme #2. Who Does The Design Serve?

Choreography

The reviewers frequently used "I" language referring to their experience with the dance choreography. This language helps convey the individuality of the designers, but primarily serves to draw attention to the user experience of viewing a performance. The reviews emphasized the importance of connection with the audience, and individual members therein. As such, the instructors described their emotional experiences with the performances, perhaps as a conduit for the eventual audience. In the following quote, Sophie describes her reaction to Anita's piece.

> *Sophie*: I felt a really emotional reaction to that like I was like *ahh*, you know? I'm good, feeling something and there were kind of tears in my eye, but I didn't know why. I was feeling something. That it did feel overall like kind of inner codes, um, you know, not so much like a secret society but women who, who stick together and survive even when they're minimized and I was having – I was kind of going there.

Industrial Design

During the design reviews, Gary and the students frequently used "they" language to refer to the client who would be evaluating the chair designs. These conversations covered whether the students met "their" requirements, what "they" might do with the design if it is selected, and how to best convey the essence of the design to "them." Thus, the design primarily serves the client. As Gary and Ellie discuss in the following quote, the clients direct design changes and have the power to accept or reject potential design elements.

> *Gary:* So, I mean they, they were fine with this then, right?
> *Esther:* Yeah, but they, so they want it taller.
> *Gary:* Now were they fine on this being bent plywood or something?
> *Esther:* Yeah, they said that.

Interestingly, Gary occasionally directed students to avoid specific requirements or suggestions from clients. Often, as in the quote below with Esther, he indicated that the requirements "they" gave were to challenging and even contradictory, and guided her to do what she could. This and

other "you" language indicated that the designer also had some ownership of the design and should also make certain decisions to serve their own best interests or creative vision.

> *Gary*: It's really a little mixing of last Friday by saying they, some people, they wanted to make it more like a "looks like", but that's not what everyone agreed to, and you don't have a great amount of time to do that. So this is just a, a full-size form model, and use the materials, inexpensive materials. I mean obviously, if you want to add some color that, you could do that.

Mechanical Engineering

In contrast to the choreography and industrial design instructors, mechanical engineering feedback was characterized by "we" feedback. For example, in responding to students discussing performance of a servo motor, he said, "We predicted that, right?" Another example of "we" language is presented in the excerpt below, this time when discussing the issues with the performance of a robot. This language inserts the instructor as part of the engineering team and works to solidify the team-oriented nature of the project. It is interesting to note that Nelson also refers to the team in "you" terms, primarily when giving presentation instructions and asking clarifying questions. This distancing mechanism is, thus, related to elements outside of engineering and instead can be considered part of the teacher/student dynamic.

> *Nelson:* So why don't we have more batteries?
> *Mark:* Well, we, we tried to go get the ones that we needed, and we couldn't find them last night.
> *Nelson:* Why were we trying to get 'em last night as opposed to in the last three months?
> *Brody:* Well, we – I think we just underestimated how the, ah –
> *Jeffrey:* How badly the power would be.

Nelson rarely referred to the client or any potential user, thus the design in mechanical engineering appeared to be serving the designer. Students put in hours of hard work; they made decisions, perhaps not to suit themselves but to achieve functionality; and success or failure of the prototype (as indicated by a course grade) is theirs.

Theme #3. What Are Aspects of Good Design?
The design review sessions provided evidence of good design through the praises given to the student designers and aspect of their designs or a project grade stated during a session.

Choreography
In choreography, aspects of good design presented as descriptors of positive elements of the performance. The three most commonly praised aspects were originality/surprise, elegance (combination of beauty and simplicity), and connection with the audience. These first two elements are evident in a discussion among Holly, Claire, and Mia.

Hannah:	I think we're just talking a couple of quicknesses, surprises –
Anita:	Okay.
Hannah:	- just little ripples.
Anita:	Okay.
Claire:	And if you do it where Rachel suggested then it will be beautiful.
Hannah:	Yeah.
Mia:	Yeah, too, you know, it becomes a little bit predictable with the walking because they're always doing it exactly with the beat. They never double it. They never halve it. It's just on the beat, which is fine because it's sort of – for me that's one of the definitions of the piece is that walk, um, and I, I really think because there's this beauty and the simplicity of the way they stand and present themselves to us…

Part of the connection with the audience results in an emotional reaction from members of the audience, as was described by Sophie in the *Who Does the Design Serve* section. Incumbent in this, however, is the need for clarity in the piece, so the audience can understand the message, story, and emotions being conveyed. Hannah suggests a change to Edite's piece to add clarity and new information her message.

> *Hannah*: I don't see hers developing my knowledge of what's happening. It's reiterating what's happening, but I'd love for something new to happen that gives me more information about who they are, she is or whatever. Um, when they, um, so they're just getting so clear now and so great.

Further, the story must be communicated in all aspects of the dance, from the moves to the clothing to the body, and even to the face as illustrated below in Mia's advice to Anita.

> *Mia*: I really think because there's this beauty and the simplicity of the way they stand – and present themselves to us throughout the turn time that they really need to know who they are in their face because their body is saying it, but their faces aren't… But because we're seeing this, um, diversity in the face, I don't think they know who they are in the face.

Industrial Design

Good design in industrial design lived at the balance of aesthetic, humanistic, and technical elements. In the aesthetic category, Gary drew the students' attention to the form of the piece as well as the visual presentation of the physical and computer-rendered prototypes. A quality design needed to be visually appealing for a user and present the desired image for the client. Technical elements such as structural materials, functionality of any moving elements, weight

limit were all considerations. Gary also urged the students to consider comfort and the physical act of sitting for the potential users. The example below demonstrates Gary suggesting potential changes in technical aspects to improve humanistic quality.

> *Gary*: Be conscious of where different positions of where the person's – the person's sitting there, thinking about your ergonomics whether the heel's gonna hit that, that sort of thing. And stay with what you have. Is that comfortable with the armrest?

Mechanical Engineering

While the key elements of design quality presented during discussions of what student did well or should reconsider with their designs in both choreography and industrial design, Nelson made the key characteristic of quality design in mechanical engineering, functionality, evident in his requirements for the design presentation and administration of grades. A quality design needed to meet the functional requirements set earlier in the semester, as demonstrated by a working prototype. One striking example of the importance of functionality above all else is that one team (Cap Team) was not allowed to participate in the final review because their prototype did not function. As further evidence of the importance of having a working prototype to demonstrate functionality, the team's evidence of the prototype working in the past was not sufficient.

Theme #4. What Are Components of the Design Process?
Choreography

The design reviews in choreography stressed the importance of both multivocal feedback as well as attention to detail during the design process. The multivocal feedback element ties into the importance of individuality and the individual experience of audience members. Since a piece is likely to connect with different individuals in different ways, it is valuable to receive feedback from a variety of sources who may provide valuable input for different components of a design. In some cases this feedback works in harmony to help the design gain a more diversified appreciation for design. In other cases, disagreement among reviewers can become flummoxing for the designer. For example, in the following extended passage, the instructors have a conversation around Anita's piece, first agreeing upon and clarifying for Anita their concerns about the dancers' comfort with their garments and then disagreeing upon the appropriateness of using different colors for different dancers.

> *Mia:* But you definitely, um, I think you definitely want to make sure you get those leotards down because I think that's part of what Rachel's talking about –
> *Anita:* They -
> *Mia:* - that reserved chest thing. It's like they're afraid their breasts are gonna show and they have this tension here that you can still have that power without mound.

Hannah: I had a note on that, too, I just didn't say it, and the way I put it was I want them to feel like their molecules are expanding a little bit instead of being all tight just like –

.....

Mia: Well and, too, the idea that you have two colored bodies in the same color top makes me wonder are they different?
You know, why, why aren't they in the same color body because they're all in the same color top?

Hannah: You know, because they're so similar, it doesn't faze me in the least.

Mia: I know but it does me. I don't know. It's just, you know, it's just what I see.

Hannah: Yeah, I'm just giving her another opinion. I, to me they don't turn into teams because of the two colors.

Sophie: Me, too.

Industrial Design

While Gary emphasized clean and simple design in the look like prototypes, the design process in industrial design was presented as messy and frenetic. This characteristic starts with the studio room which is cluttered with personal effects, noisy, and somewhat chaotic. The flexibility required of designers and openness to design changes adds to this message. As Gary describes it, sometimes the design takes a mind of its own and the designer acts more as a conduit for the anthropomorphized design. As he described to Addison:

Gary: I wanted you to gravitate to the one that you liked the best. You're the designer. You, you get to take hold and, and, and direct, direct, direct some obviously, where it needs to go.

Gary later emphasized that "you're never gonna get exactly what you want," and recommended that designers "dial in the concept until you feel good about it." So here, design is a fluid and uncertain process, and it is the designer's job to navigate these murky waters.

Mechanical Engineering

In mechanical engineering, Nelson presented the design process as series of design decisions and troubleshooting. He further emphasized that these decisions be rationale and reasoned by framing his questions to request what they did and why. For example, the following example, Nelson asks why the students made a particular design decision. Mark begins to answer without providing a rational explanation, but Ellie quickly corrects him, perhaps in response to Nelson's implicit messaging of the rationale mechanical engineering design identity.

Nelson: Why do we go to the relay?

Matthew: Just because we didn't –

> *Ellie:*   When you powered it before, the boards would turn on always. So they were always on, and we wanted to be able to turn them off.

4.2.   Discussion

While design is common to a number of disciplines such as engineering, industrial design, and chorography, there are few studies that investigate the institutional identities in these disciplines. Such studies can inform identity conflicts that design professions may be experiencing. Pable (2009) has written about a dilemma between subjective artistic expression and scientific principles guiding design decision making for interior design profession. In our analysis, we identified evidence of how identity was communicated through design reviews. The differences between the three disciplines were most evident in relationship to speech, actions, and values.

Speech conveyed the institutional identities in two ways, through its content and length. For example, in choreography the review sessions were long, discourse-intensive, and emotive. The review criteria and feedback were subjective In contrast, in mechanical engineering, the review sessions were short, concise. *Actions* reflected the nature and structure of reviews, which was individualized and detailed in Choreography, constructive and specific in Industrial Design and objective and succinct in Mechanical Engineering. *Values* provided evidence of disciplinary epistemological perspectives that ranged from relativist with multiple realities presented to the students, to constructivist where students constructed their own understandings, and positivist with uniform requirements for evaluating performance. In Choreography, the reviewers also paid attention to detail and creativity was expected in all elements. "I" language was used frequently. Audience was not a single uniform entity but a collection of individuals. In industrial design, the reviewer focused on the vision including the products' material, structural elements, and aesthetics although functionality was not required. The design process was messy and reflective and required interacting with both people and thing. "They" language, referring to the user or client, was used frequently. Creativity was expected in association with aesthetics or form. In mechanical engineering, the review process was well-planned, on-time, short and feedback was rational and objective. Creativity was needed or valued when solving unexpected problems or while troubleshooting. "We" language, referring to the student team, was used most frequently. In addition, all disciplines discussed concerns about time and deadlines. *Gestures* were prominent in Choreography.

The *environment* as well as the *gestures* of each instructor modeled the professional skills expected. The differences in power relationship, specifically though the setup of the design review environment, was also noted. In choreography, the process included reviews of both student and teacher products although students did not give instructors feedback. Compared to industrial design and mechanical engineering, choreography students had little voice in explaining and defending their design decisions but they received generous and detailed feedback. Compared to the other disciplines, choreography stood out with the abundance of

individual feedback. In mechanical engineering, the students positioned across a table from the instructor and were provided with clear expectations. The mechanical engineering students were given opportunities to defend their design decisions but review process was short.

5.　　　Conclusions

While we were not able to locate any comparative studies, our findings in engineering confirms the disciplinary identities lived in some workplaces (Kilduff, Funk, & Mehra, 1997). Kilduff et al examined the identities of the engineers at a high technology factory. While the physical arrangement of their work site was arranged based on the organizational hierarchy, the open-space seating allowed interactions among team members. A similar interaction was evident in the mechanical engineering setting. By making the implicit identities of these disciplines more explicit through our analysis, our work can have important implications for practice by helping educators ask whether the institutional identities we are creating through our talk are the identities we want to be creating. We invite design educators to engage in such reflection on how our talk creates these identities that we believe about our professions as a whole. Faculty mentors play a critical role in communicating disciplinary identities, and at times cross-institutional identities between university and the workplace (Smith, 2011). Our work suggests the critical role of mentors as those model and translate disciplinary identity not just as those who serve a source of knowledge transfer or social capital to mentees (Rigg & O'Dwyer, 2012).

Our analysis also showed a relationship between a focus on individuality and creative identity of a discipline. This suggests that disciplines such as mechanical engineering where teamwork is emphasized, may need to identify ways to reinforce element of individuality (being an individual and imbuing that in design but also being able to connect design with individual users) as an aspect of creativity in collaborative design. There were also similarities in how instructors modeled institutional identities as well as disciplinary epistemological differences revealed for example in the subjectivity of reviews.

In conclusion, our results suggest that disciplines that engage in design have much to learn from one another. In particular, our findings have implications for supporting interdisciplinary collaborations highlighting the ways values and beliefs can conflict or align. We also hope that our work prompt educators to ask whether the institutional identities they are creating through discourse are the identities they want to be creating. We hope that this publication informs both students and instructors on how the design reviews they experience embody aspects of their discipline and disciplinary culture. The ways coaches structure design reviews can be enhanced by making implicit or tacit qualities more explicit and actionable. Design reviews are not just an evaluation and grading mechanism but a process where new designers are socialized into their disciplinary culture.

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