

Observations from an Open, Connected and Evolving Learning Environment

A Room With No Name

In 1999, a room named "This Room Has No Name" opened its doors in the heart of the Media Union, a grand new facility for the University of Michigan's colleges of Art, Architecture, Engineering, and Music. A small group of students and faculty members from each college had worked together for months to decide on the initial contents of the room. With the goal to attract peers who would work across disciplines and outside of the prescribed curricula, they requested: empty space; sketching tools (digital and analog);¹ "converging technology" (unsanctioned, edgy tools of interest to emerging groups); and most importantly - funding for students whose interests would drive new investments, and whose regular presence would foster both academic and social connections among new participants. Gradually, the room developed into a multi-faceted learning environment with a distinctive cultural character representative of its members.

Today this room, now known as "Design Lab 1" (DL1)², is thriving. A recent mixed-method descriptive study of the environment suggests that DL1 offers unique advantages and opportunities, and that users highly value the cultural, physical, technological and programmatic features that allow them to feel comfortable, connected, productive, and free to initiate change in the space. Informed by DL1 practice and research, the Library's Digital Media Commons (DMC), of which DL1 is a part, is beginning to introduce the Design Lab learning

¹ "Sketching tools," in this context refers broadly to the first level of simple and quick tools, possibly unique to each discipline, used to initially, and iteratively explore and communicate design ideas.

² <http://www.dc.umich.edu/dl1/>

environment model in companion locations. These will not be generic learning spaces; DMC Design Labs will each have a unique character, reflecting different ambient (and emerging) academic interests and cultures--as expressed through use--among cross-disciplinary "anchor" groups in each location.

As broad interest in learning environments which support connected learning grows,³ we believe it valuable to describe DL1 as viewed from our data, highlighting elements of this in-person model that appear fundamental to user experience. In the core of this paper we will present a "show and tell" of data and narration (primarily using time-lapse video and respondent quotes, but also researcher observations and summary survey data) to create a window into course-focused DL1 activities. Through this we hope to communicate something of the complex, interrelated structures observed there that appear to enable users to truly engage, and DL1 to come to life.

Introductory Montage

First, a montage of brief motifs in time-lapse video⁴ to provide an introduction to DL1 in use, and to begin to illustrate the ways in which users continuously adapt it to meet their needs.

Video 1: DL1 Montage

³ See: Ito, Mizuko, Kris Gutiérrez, Sonia Livingstone, Bill Penuel, Jean Rhodes, Katie Salen, Juliet Schor, Julian Sefton-Green, and S Craig Watkins. *Connected Learning: An Agenda for Research and Design*. Digital Media and Learning Research Hub, 2013.

⁴ The images and video included in this paper have been selectively smudged or reduced in resolution to help mask individual identities.



Research Process Overview

The DL1 research reported here was funded by the University of Michigan Library to develop an evidence-based, descriptive understanding of DL1 and of the historical GROCS⁵ program. Two teams of UM graduate student researchers, and one faculty-level independent researcher, working under the direction of the Library's USE lab,⁶ conducted data gathering and initial analysis activities throughout 2012. DL1 and GROCS teams were administratively linked, and

⁵ Grant Opportunities in Collaborative Spaces was a program, housed in DL1 (though now dormant) that funded interdisciplinary student teams engaged in research of their own design. The activities of GROCS grant participants played an important generative role in the early, user-centered, development and evolution of DL1. More information is available at: <http://www.dc.umich.edu/dmc/grocs/index.html>

⁶ Steve Lonn (USE Lab Assistant Director, <http://www.umich.edu/~uselab/>), Matthew Barritt, Natalie Davis, Harry Kashdan, Chris Leeder, Andrea Neuhoﬀ, Stanley Ritsema

provided mutual support in periodic joint research meetings, but data gathering, analysis, and reporting activities were separate.⁷

DL1 data was collected from February, 2012 through the end of December, 2012, spanning two full terms of course use of DL1 (winter and fall terms) and one summer (a less active time in DL1 without scheduled courses).

Research activities began with gathering and review of DL1-related historical materials and ethnographic observations in DL1 (immersive and visibly present in the space, even participating in some ways, and with the creation of written observation notes). Immersive observations, primarily conducted by the independent researcher, continued throughout the year-long study period. Interviews began in late March, 2012 (approximately in the middle of the first term under study) and continued through the summer, 2012, involving six faculty, fourteen students, six student consultants, three DMC staff and one DL1 "power user." Interviews were conducted both singly, and in small groups of respondents (up to three). Faculty interviewed were affiliated (some jointly) with the School of Music, Theater and Dance, the School of Art and Design, and the College of Engineering.

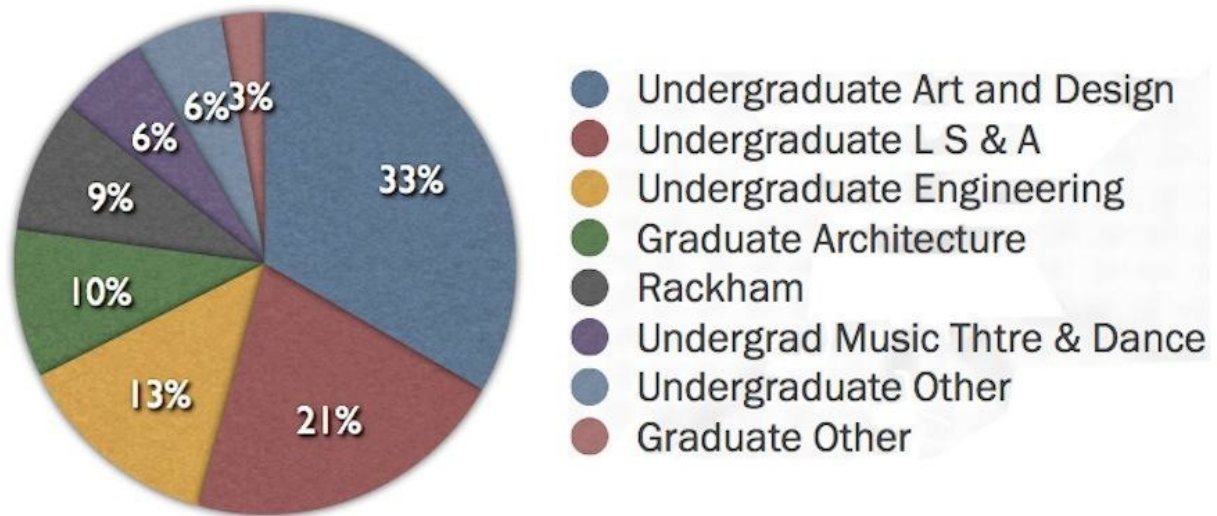
Interviews were transcribed and, along with research observation notes, entered into a Dedoose⁸ database. These data were coded using Grounded Theory open-coding,⁹ allowing themes to emerge and then thematically organizing and grouping codes by these themes.

An online student survey was drafted near the end of the first term of the study addressing emergent themes from the initial analysis of the observation and interview data with both closed and open-ended questions. The survey was administered to the full population of students enrolled in courses observed during the study period (once at the end of winter term and again at the end of fall term, 2012). A total of 119 student survey respondents completed the survey (an additional 45 partially completed the survey). Open-ended survey responses were added to the Dedoose database and coded.

⁷ GROCS findings are reported at: <http://www.educause.edu/ero/article/grocs-longitudinal-impacts-student-initiated-interdisciplinary-collaborative-projects>

⁸ An online, collaborative qualitative data analysis tool: <http://app.dedoose.com>

⁹ http://en.wikipedia.org/wiki/Grounded_theory

Figure 1: Department Affiliations of Student Survey Respondents

Time-lapse image data were also collected. A camera was installed near the ceiling, observing the entire room from this vantage point, during four weeks of the winter term, 2012, and for the entirety of the fall, 2012 term (beginning in the week prior to the term in order to capture faculty preparation activities). One image was captured every minute, 24 hours a day. These data were gathered weekly during the study period and amalgamated into a by-date-and-time, randomly accessible, archive.

Design Lab 1 Today

The Campus Context

Interviewer: "So, why didn't it look like a classroom?"

Student : "I'm used to seeing just rows of desks or like chairs or...the first thing you notice [about DL1] is there was a lot of open space and...bean bags [chairs], there are tons of computers and in the front during that time, there were like our projects, other people's projects were hanging up in the glass wall and it just looked very cozy almost. It didn't seem like ... your traditional, 'sit down let's read from a textbook' kind of classroom."

(Student Interview Respondent - P020)

The building that was the Media Union in 1999 is now the Duderstadt Center. Funded by each of the North Campus colleges and the University Library, it houses a variety of programs to encourage academic activity at the intersection of art, science, and engineering. The largest presences in the building are the Art, Architecture and Engineering Library¹⁰, and the Library's Digital Media Commons¹¹, which maintains a collection of related facilities including the UM 3DLab, a professional audio studio, a video studio, electronic music production studios, high-end media editing studios and work stations, and a gallery space -- in addition to DL1. Each of these highly-accessible resources are staffed with professionals and students who are content experts in their domains. The room that the architects labeled "Design Lab 1" is positioned with its wall of glass doors facing the "Central Collaboration Area"¹² in the center of the ground floor of the building.



¹⁰ <http://www.lib.umich.edu/art-architecture-engineering-library>

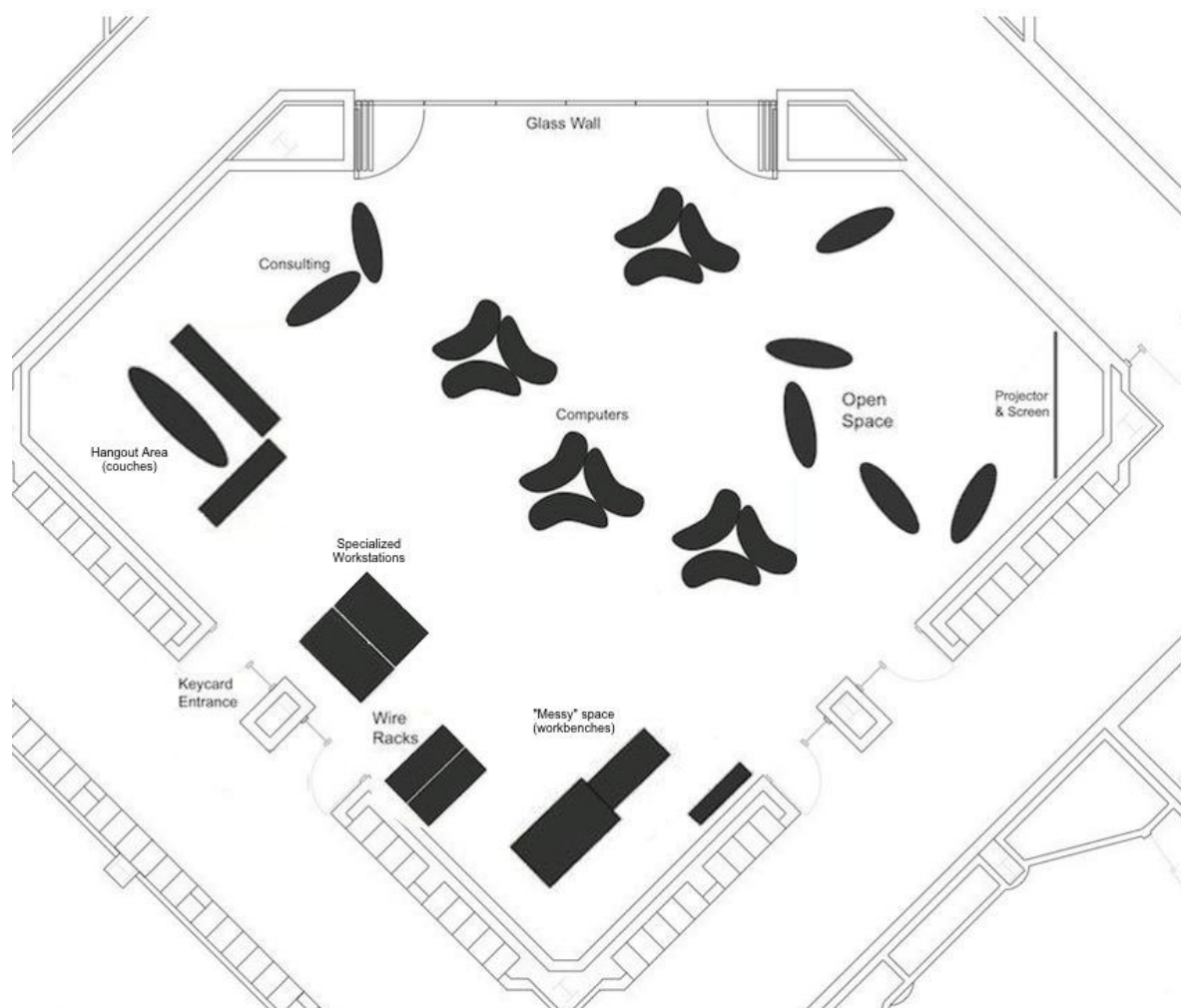
¹¹ <http://www.dc.umich.edu/dmc/index.html>

¹² The Central Collaboration Area has become just what it was intended to be: an area frequented not only by students and faculty members, but also by the staff who support them.

Fixed and Flexible Activity Areas

From the beginning, everything in DL1 has been on wheels or has been relatively light and easily moveable: chairs, computer workstations, whiteboards - even couches, workbenches, and the projector and screen. Users are encouraged to create arrangements that serve their own needs, but to leave the room in a practical condition for others. Over time, recurring activities have determined relatively fixed arrangements of furniture which persist for a few years, until changing users and new technologies bring activities that determine new arrangements. At the time of the research project, the room included clustered iMacs running Windows and MacOS, and distinct areas for presenting, hanging out, working with special technology, and working with messy materials.

Figure 2: DL1 Floor Plan





The computers (Apple iMacs) are locked onto small wheeled tables, fitted with outlets powered from a ceiling grid. The tables are generally clustered into pods that can shift position throughout the day.

The computers are dual-bootable, and loaded with Mac and Windows applications selected from the load sets of each of the North Campus colleges, creating an amalgam of both familiar and unfamiliar tools from across the represented fields. The load sets are updated annually, but users may request additions at any time. During the period of the research project, student staff members were developing administrative practices to allow students users to add open source applications to the load set themselves, and to annotate version updates, primarily to accommodate projects involving simple embedded systems.

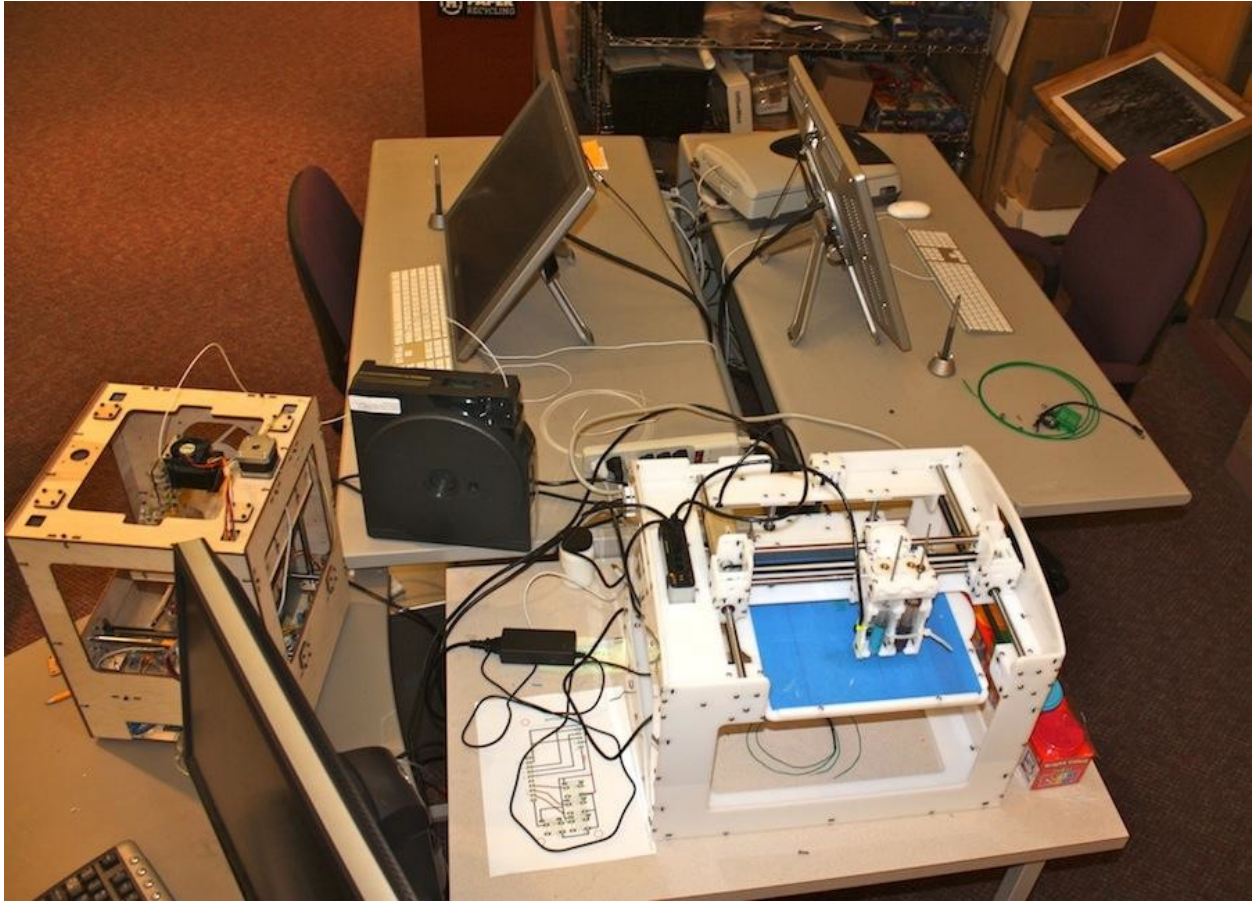


The presentation area can include or exclude students at the iMac pods nearby. Critiques and discussions take place around the unencumbered oval tables (those tables which are normally empty when not in use), or the tables are wheeled off leaving chairs or cushions and beanbags in the middle of the room.

The projector, screen and sound system are of high quality to adequately present the range of sounds, colors and textures essential to fine art course work.



The hangout area holds eight to ten people. Students exhibit projects on the video display or on the shelves. A long VGA cable reaches anywhere, for live viewing from laptops. Paper plates, napkins and cleaning supplies are also prominently stored on the shelves.



During the research period, a “special technology” area included two heavy-duty Mac towers, administered entirely by the student staff, running multiple operating systems used for a variety of devices that were introduced or requested by users: Cintiqs, 3D printers, Arduinos, Kinects, Epocs, etc. Most of the devices were relatively self-contained and were easy to roll or carry in and out of the area as projects shifted throughout the day.



The “messy work” area evolved from an earlier drawing, painting and paper prototyping space into a basic electronic workbench, largely through the influence of a resident course in “Smart Surfaces” in 2009.¹³ Up to four people can work together around the soldering bench, and up to six can work around the old drafting table. Projects in progress are stored on wire shelving, which is also on wheels so that this work area can be adjusted and doubled in size if necessary.

User Expectations and Aspirations

Faculty who taught in DL1 during the study period were self-selecting and report being drawn to the space for its ability to support active engagement, for its support of fluid movement across various interaction “shapes,” for its support of

¹³ From the Smart Surfaces Web site (<http://www.smartsurfaces.net/fall2009>): “SmartSurfaces offers an integrative, hands-on learning experience where cross-disciplinary teams design, build and test interactive surfaces that have the capacity to adapt to information and environmental conditions. The course operates as a cross-disciplinary, hands-on think-tank where participants pool their knowledge and skills to work together to produce environmentally sound and socially responsible projects.”

hybrid "lecture/lab" curricular designs, for its comfort, and for its nature as a "homey," inhabited space. Prior to teaching in DL1 these faculty were already attempting to implement active learning engagement in more traditional classroom and studio environments and were struggling with these spaces' inherent constraints and cold, hard nature.

"I was immediately attracted to DL1...the way that it has open walls, the way that the seating is arranged, I really liked that whole...I immediately understood what it was about.... I thought this is a really great way for a teaching environment to be set up."

(Faculty Interview Respondent - P086)

"And then I learned that there was this space over here which is much more conducive to being a normal person."

"You need two kinds of spaces. You need a space to work and you need a space to have a conversation and watch stuff. Those are the two things I need. DL1 has both, and it's comfortable, like it's for humans, it's not these horrible chairs and these horrible [fluorescent] lights."

(Faculty Interview Respondent - P096)

"The spaces that we have [in the department] are really kind of inadequate for this kind of class."

(Faculty Interview Respondent - P088)

What They Were Moving Away From

Faculty and student respondents repeatedly described a wide range of characteristics of the spaces that they were, in effect, trying to move away from and that they believed presented strong contrasts with DL1. The characteristics, independently described by both groups, were remarkably similar. They included:

For faculty:

- Physical spaces that impose one-to-many communication modes via any of a number of design characteristics such as:
 - Fixed rows of student tables facing the front of the room (lecture halls and computer training rooms in particular). Faculty talked about

these rooms as being like "slave ships," of feeling "like...an airline steward," and constrained movement that was "all lateral."¹⁴

- Raked rooms
- Fixed podiums
- Rooms with obstructed line of sight between faculty and students as well as from student to student (this was generally in reference to large computer monitors on fixed-row tables)

"There's big computer screens. Often the students were behind the screens so I always asked them to kind of pull out to the side."

(Faculty Interview Respondent - P088)

- Rooms without sufficient free space to easily move furniture
- Rooms without sufficient support for student laptops (space on tables, power, network, access to projection, etc.,...)
- Inability to easily move around the room in order to reach individual students (primarily in fixed-row tabled rooms and over crowded--high ratio furniture and people to space--rooms)
- Inability to move students into small groups (again, in physically constrained rooms and rooms too small to allow sufficient sound separation between groups)
- Tables which impose a limited palette of room arrangements (or just one) due to their size or design
- Bright, non-adjustable fluorescent lighting
- Hard surfaced, reverberant acoustics (which in particular relates to the issue of how much space is necessary between student groups engaged in active discussion and work)

Students:

- Difficulty accessing peers for ad hoc or planned interaction due to characteristics such as:

¹⁴ Faculty Interview Respondents P086 and P088

- Fixed-row tabled rooms
 - Insufficient space (relative to furniture or number of students) to permit easy, non-disruptive movement in the room (once all the students are in the room and class has begun)
 - Uncomfortable seating (from which they described pain, distraction, and worsening of mood with attendant changes in their interaction with peers and faculty during collaboration or other active engagement)
 - Not enough room to rearrange themselves and their work as would best suit their needs (to adjust their position in the room relative to collaborating peers, to adopt non-standard ways of sitting for increased comfort, to support flexible arrangement of materials, etc.)
 - Large tables enforcing one type of room arrangement
 - "Harsh," overly bright light not conducive to computer monitor use (and leading to headaches and other complaints). One student respondent related traditional classrooms light to an "interrogation room."¹⁵
 - Rules and policies (or culture) that create uncertainty and apprehension
- "Other labs or spaces on campus feel like they have very strict rules that I might not know/might break on accident. I always feel like I'm walking on thin ice whenever I'm working in other labs."*
(Student Survey Respondent - P065)
- Furniture not on wheels, or that is heavy, leading to difficulty (and noise) when adapting a room
 - Rooms that only support active participation in the form of discussion (rooms where making, doing, building, etc., is not possible)

"...[in non-DL1 classes] it's never hands-on activity...most of the things that we do in smaller groups...are discussion-based where we would talk about course material or readings and stuff like that."

(Student Interview Respondent - P049)

¹⁵ Student/DL1 Consultant Interview Respondent P087

What They Were Moving Toward

In contrast, faculty and student users of DL1 described a number of characteristics which they believed to be resident in DL1 and which they valued. Faculty had largely self-selected for these prior to using DL1, believing they would enable and support **active and collaborative**¹⁶ student engagement in making activities in support of learning (their stated preferred teaching approach). Many students, instead, encountered these characteristics as eye-openers and came to describe them as ideals:

- Easy **movement and adaptability** (both a physical and a cultural characteristic) in support of moment-to-moment needs
- Space designed to support active **making** (designing, building, and presenting) of both physical and virtual artifacts
- **Comfortable**, "human" space (physically, culturally and emotionally)
- **Resource rich** environment (outfitted with both software and physical tools to meet specialized topic-specific needs for design and making activity)
- **Inhabited space, rich with a community** of like minded users and staff
- **Shared, interdisciplinary** space that challenges and inspires across traditional boundaries
- A culture which affords **responsibility and control**, helping students to feel engaged and valued in their work

"Show and Tell"

DL1's users experience the space through a close interrelation between its open physical and cultural characteristics, its creation of opportunities for connections between users (and across disciplines), and the freedom and control it affords (to students and faculty alike) to adapt the space to meet one's needs. Such interrelatedness can be hard to describe as each element constantly relates to,

¹⁶ Bold text indicates broad themes which are prominent in the DL1 data, some of which we will use to structure the presentation of "images" in the "Show and Tell" below.

and influences, all others. So we will do our best to show it in time-lapse images, and in the words of users, before attempting to tell it.

Movement and Change

"I feel like I move around more in this class than I do in other classes, whether that's by the wheels of the chair or by walking around and seeing what other people are doing. There is always a slight rearrangement of the space, like one or two times [during class]." "...it's not like it's in one specific place. The room can change with you."

(Student Interview Respondent P035)

"It can be a space where people can work on computers, as a lot of times they will need to do for the kind of work that I'm teaching. But then a lot of times we need to have a discussion that needs to be a focused discussion, either a critique or a brainstorming session of ideas. And we can just pick up [roll] the chairs and move over [in DL1]"

(Faculty interview P088)

Easy and fluid movement is a fundamental constant in DL1, and a core tool in supporting active pedagogy as elements of the space are re-deployed--frequently by students themselves--in constantly changing patterns to meet immediate needs.

Video 2: Group Demos to Lecture to Guide on the Side



This class (a music department class building sensing electronic music interface devices and artwork) moves from small group demonstrations, to faculty-led presentation, and then to individual computer work with the faculty member taking a "guide on the side" role.

Video 3: Movement Through Grouped, Student-Led Presentation Activity



In this session of an inter-departmental class on the creative process students are showing work. Everyone moves from location to location in the room gathering around peer presentations. This primarily involves movement of people, rather than furniture or other room resources.

"We walked around to do critiques, the whole class, we walked around to each station since their work [was] on their computer, a classroom computer, [or on a table]....you couldn't do that in the other room upstairs or other type[s] of classroom."

(Faculty Interview Respondent - P086)

Video 4: Lecture to Lab (Individual Work)



This shows a small video effects class that begins with faculty-led, one-to-many presentation, and moves to individual student work with the faculty member participating as a guide. Students first work mostly on their own laptops and then disperse further out into the room to work on DL1 desktop computers.

With the presence of unencumbered tables, as well as tables with iMacs which are large enough to also hold a laptop, students are free to make their own decisions about when to use their own computers and when to shift to DL1 computers (in fact, students were frequently observed in the space using both, moving their attention and activity back and forth from their own laptop sitting on the table next to the larger DL1 computer, or perhaps setting the laptop on an unencumbered table which they roll up to the DL1 computer table).¹⁷

Video 5: Four Distinct Modes

¹⁷ MB observation notes, time-lapse image archive.



This 3D animation class goes through four distinct modes: faculty-led whole class presentation (with the faculty member just off the frame at the bottom right), whole class discussion (in a circle without tables), individual work, and finally a small group interaction with the faculty member.

In this environment, where classroom movement occurs with relatively little disruption to ongoing activity, students report retaining more control and responsibility over movement (and therefore choices in arrangements and resource use) than in other, more traditional spaces.

Interviewer: "Okay. As you angle the tables and set them up so you can do the things you're describing; see your peers, create the sense that you want, etc., does that come from you guys as much as from the faculty?"

Student Respondent P022: "Mainly."

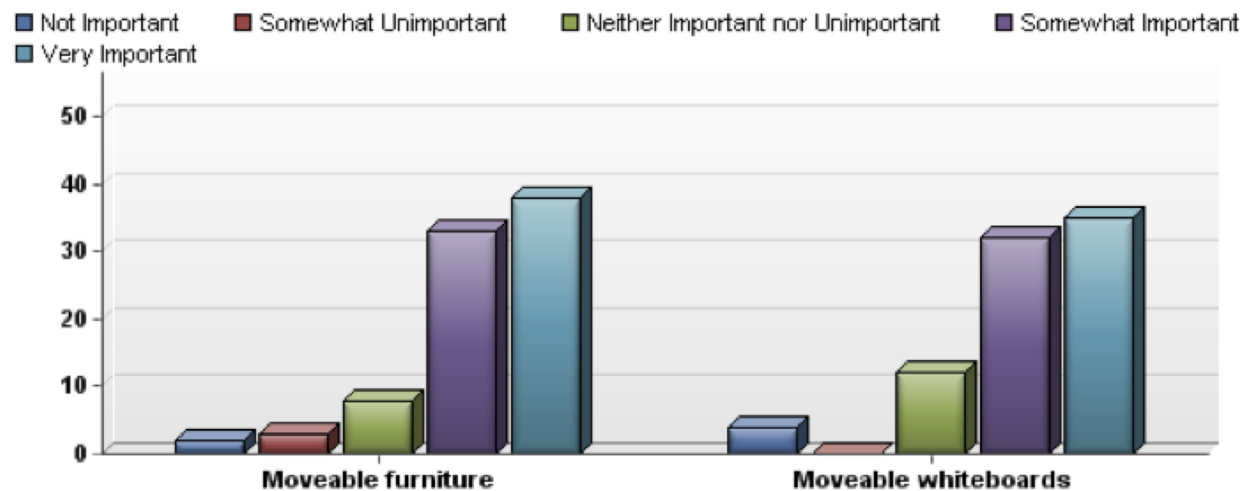
Student Respondent P092: "Yeah, mainly."

Student Respondent P022: "They [the professors] give the general sense of..., I mean, [they] would say that they want you to be able to see the

screen... and then you would just, we all moved the tables accordingly...."
(Student Interview Respondents - P022, P092)

The value of personal movement in the space was not tracked across the wider survey population. However, the importance of movement of furniture and whiteboards (implying personal movement as well) was and shows a consistently high value placed on these characteristics.

Figure 3: How Important Were - Moveable Furniture and Whiteboards?



(DL1 Winter 2012 Survey Question 22-4)

Comfort

"I think the students just feel more at ease...more like their lounge space as opposed to a lecture hall that you just, like a bus, you sit there and then you get off and leave...my preference is to have a more welcoming and homier space."

(Faculty Interview Respondent - P096)

As illustrated in this "word cloud"¹⁸ DL1 is considered to be "comfortable," along with a host of other, closely related concepts:

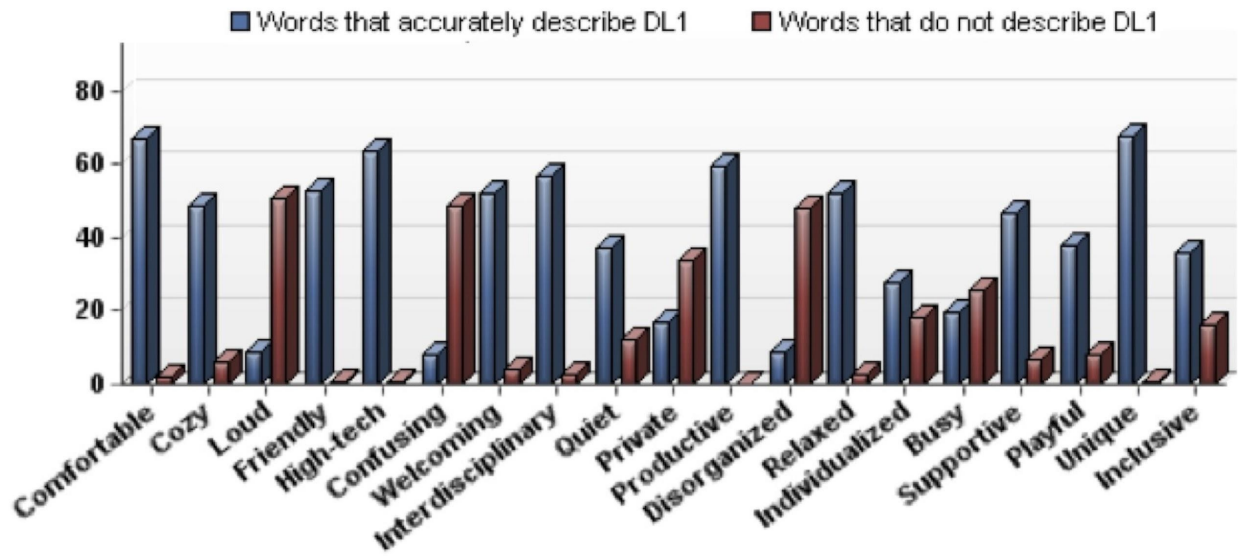
Figure x: Feel of DL1 Word Cloud



Survey responses from the wider population of students strongly reinforce these expressions of comfort:

¹⁸ This graphic shows the frequency of words used in interviews and open-ended survey responses to characterize DL1--greater frequency is indicated by increased darkness and size.

Figure 4: Words That Describe DL1



(Question 21, Winter 2012 Survey Data)

At its simplest, the obvious experiences of comfortable chairs, carpeting, couches, cushions, bean bag chairs and less-harsh lighting allowed users the opportunity for physical comfort during class (and other) activity in DL1. This was reported to have substantial consequence for supporting improved focus, mood, collaboration and productivity as well as having a strong effect on the cultural feel of the room.

Interviewer: "Does it [comfort] help you focus and concentrate in this environment?"

Student Respondent P089: "Yeah, it does. Definitely."

Student Respondent P090: "Mostly because you don't have to think about how much misery you're in. You don't have to think about how uncomfortable you are."

(Student Interview Respondents - P089, P090)

"Usually when I'm collaborating on a project, its nice to have a space with a beanbag and carpet instead of a hard stool and cement floors... collaboration can be an extensive process."

(Survey Interview Respondent - P009)

"It is a much more relaxed and comfortable place. I can work for long periods of time without getting irritable."

(Student Survey Respondent - P030)

"I feel really comfortable and at ease, but also really ready to work and be productive."

(Student Interview Respondent - P089)

"In DL1 it's just more relaxed and you just feel... It's more like you [can] build upon your work and to get helpful feedback and to improve. That's how I really feel in there, is that everyone's there to help you improve because everyone is just in a general better mood because they're comfortable where they're sitting for a long stretch of time."

(Student Interview - P022)

Video 6: Alternative Seating



In this video an in-class collaborative project group has chosen to arrange themselves on the floor on beanbag chairs and cushions, working with laptops.¹⁹ When the faculty member comes over she adapts to the student's choice, kneeling and sitting on the floor with them. The physical flexibility and adaptability of the room in affording comfort, and it's cultural informality, becomes an invitation for faculty members themselves be informal, flexible and adaptive both figuratively and literally.

"It's really important [a comfortable, open atmosphere] because I think it sets up a situation where the teacher is much more of a coworker. We are all coworkers rather than it being this sort of person who is different.... It goes to a collaborative thing. It goes much more to this thing where we are all working together rather than a hierarchical situation...."

(Faculty Interview Respondent - P086)

The less obvious, and centrally important, experience of “emotional” and cultural comfort emerged strongly in the data. In this, comfort was discussed as relating to the trusting, permissive policies of the DL1 administration, the sense of supportive community in the space, as well as to the shared exclusivity of special after-hours access. Students felt safe in DL1, and empowered, and they described this as being productivity enhancing.

"It's a very open area for conversation. The whole place, you just feel very comfortable there, and it's a perfect place to just collaborate and share ideas and help each other. And it's, honestly, just the most comfortable room I've been in emotionally where I always enjoy my time in that room."

(Student Interview Respondent - P022)

Q25: What do you think is different about DL1 than other instructional / lab / learning spaces on campus?

"It is the most inviting classroom I have ever been in. It helps me relax into my work - it helps de-stress me."

(Student Survey Respondent - P021)

Video 7: An Hour's Work in the Hangout Area

¹⁹ While we have highlighted this one example, user adaptations for personal physical comfort are present throughout nearly all DL1 use and were visible throughout the observation and time-lapse data.



While this paper focuses on course use of DL1, the DL1 community includes a great deal of individual and small group student use outside of class time. In this example a student has chosen to work in DL1 on her own and perch on the couches in the hangout area, working from her laptop, changing her position frequently, and periodically interacting with the people nearby. This should look familiar to anyone who has watched a young person work in their living room. DL1 brings elements of this "homey" experience into the campus learning space.

A Shared Space

There are at least two distinct modes to DL1 shared use: users sharing the space through simultaneous activity, and users sharing the space through material artifacts that persist and become a shared context. Both play a strong role in forming the inclusive culture and multidisciplinary experience of the space.

Interviewer: "Has anything happened while you were teaching that was surprising to you? That maybe you had to adapt to or..."

Faculty Respondent: "I guess the main thing at first was just that there's other people in the room and they're going in and out in the back and that's part of the experience, that they could join in, or they could be in the back doing, I don't know what, having tea. So, that's something to adjust to because you don't have that when you're teaching at any, pretty much any other space in the university."

(Faculty Interview Respondent - P096)

"The first day when we had class there, I just thought it was weird because I never had random people standing around while we're in class. But then after like the second... Actually, by the end of the class in the first day, I think we got used to it and just like understood that it's an open environment and you just kind of do what you had to do with the area."

(Student Interview Respondent - P049)

Video 8: Poets and Robots



This video begins with a team of students from the robotics course working outside of their class time. Just to the side of them (at the right edge of the video frame) a single user works on a desktop computer. She is a faculty member waiting for the beginning of her small poetry class to convene. Eventually, you see the three students in the poetry class arrive and the two groups continue to work alongside of each other; poetry students experiencing robotic engineering activity at the periphery of their class, and robotics students listening in on a literature class' discussion. Note as well other users in the room (in the workbench, "messy" work area, and sitting and working on the couches in the hangout area).

Very few programmatic activities occur in DL1 without other users also working in the space at the same time. As the populations blend, observation, interaction and ad hoc support happens naturally.

Interviewer: "Do you ever find when you're teaching that someone else who's in the room has turned their chair around and...gotten interested in

the topic and is actually watching and listening?

Faculty Respondent: "Oh yeah, oh yeah. That happens often."

(Faculty Interview Respondent - P086)

One pedagogical consequence of the presence of other users in the room during class sessions, whether DMC staff or other knowledgeable users, is that faculty members have immediate access to support while teaching, whether to move a whiteboard out of the way after it spontaneously falls off the wall,²⁰ or to resolve technical issues during sessions dependent on computer projection, or other technologies. The presence of a community of knowledgeable users immediately at hand and willing to help frees faculty and students to remain focused on their primary tasks.

Interviewer: "What you [just] described was that when there was a technical problem, there ended up being this whole host of people readily available. It kind of grew and went from one person to the next."

Faculty Respondent: "That's true. Yeah. For sure I don't have that ability in my own school."

Interviewer: "To have people readily available?"

Faculty Respondent: "No, there's nobody to call. ...in Design Lab 1, if [the DL1 program manager] is there then she helps me get somebody. She's usually there [or] one of the students is there or...I go and check...in the GroundWorks [a lab directly across the hall from DL1]."

(Faculty Interview Respondent - P096)

Video 9: Active Work By Students From Two Different Courses (Music Technology and Robotics) - All Areas of the Room in Use At Once

²⁰ MB observation notes.



In this video students from the robotics course (which is in session) and the electronic music interfaces course (which is not in session) are sharing the space and are engaged in extensive group work and making activity. Note the activity in the upper left and upper right corners of the video frame (the "messy" workbench area and hangout area) dominated by students from the music course, while the robotics students work in groups around computer work tables spread elsewhere throughout the room.

Work created by users is visible in DL1, both while in progress, and frequently after it is completed, as it is displayed or stored there for varying periods of time. This creates a constantly changing environment in which users report being inspired and stimulated by what they see and experience around them. The room is awash in the bits and pieces of ongoing construction and creation projects (from both art and engineering projects). Spending any time at all in DL1 brings one into contact with in-progress artifacts and the (usually interesting, sometimes mysterious) jetsam of earlier work.

"...there's nowhere else on campus where people leave their stuff [in progress work] and you can see it or touch it or whatever."

(Faculty Respondent P096)

"DL1 makes it possible for me to look around for inspiration.... Sometimes I'll go over to other people's projects and ask to have a look, and most of the time people are very willing to show their work. It's a very nice, interactive space that I am thankful for having found. I like that it's a little cluttered, and makes me feel very comfortable being creative."

(Student Survey Respondent - P058)

"The space provides a lot of overlap in group work, it's hard to not notice what others are doing while working in DL1"

(Student Survey Respondent - P012)

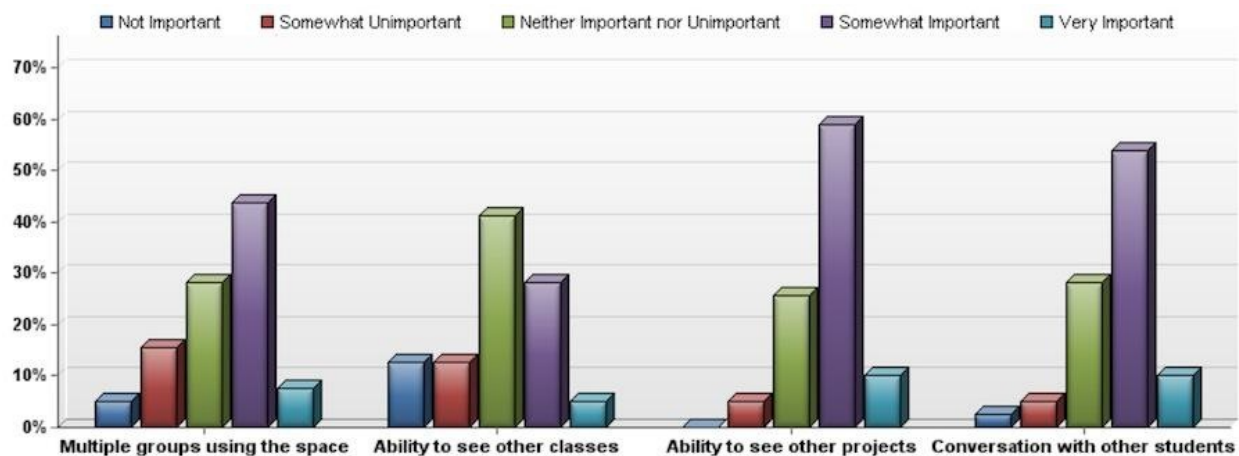
Video 10: Classroom or Gallery?



This time-lapse video condenses images over a period of four days as a graduate student artist sets up an art installation in the glass wall area of DL1 literally at the edge of instructional activity (look to the right edge of the video frame). This installation, an inventive, complicated piece using optics, electronics, and small sets with hidden miniature video displays, brings observers into the art by incorporating live video of them into the piece. This work was not a part of a DL1 course. The artist simply asked to experiment with it there and present it in DL1. Note, near the end of the video as a class is convening, students stop by and talk with the artist before moving on into the room for their course.

Student survey respondents valued the mixing of user populations, interaction, and activities that occur in DL1. While not overwhelmingly positive ("Ability to see other classes" is only slightly weighted to the positive overall), "Ability to see other projects," "Converse with other students," and having "Multiple groups using the space," are all strongly positive.

Figure 5: How Important were...



(Survey Question 19, Winter 2012 Survey Data)

The physical design of DL1, entirely visible from outside via the folding glass wall, also leaves it open to a form of visual sharing with external populations. The "Central Collaboration Space" outside the wall is heavily used and trafficked. Because of this a great many people, not necessarily users of DL1 themselves,

see and are familiar with DL1 activities. Users of DL1 "live" in an open environment that they know to be visible to all who pass by.

"It's open for everyone to see instead of a closed off classroom...."

(Student Interview Respondent - P051)

"It is kind of like a nice cave because you go in there and you see the glass and you can see other people outside...."

(Student Interview Respondent - P035)

"I also really like the huge window-wall and the fact that there are markers hanging from the ceiling in which students can draw on it with. It brings a lot of fun to the whole area- DL1, and the space outside DL1."

(Student Interview Respondent - P065)

"And it [the glass wall] just shows how the room is such a great collaborative environment. I mean, it basically invites you to do so right at the glass wall."

(Student Interview Respondent - P022)

Interviewer: "What do you think of the glass wall?"

Student Respondent P035: "I think it is part of the personality of it [DL1]."

(Student Interview Respondent - P035)

"I think it's really important for there to be glass, so people can see inside what's going on and so you can look outside, as well. I think that's really good."

(Faculty Interview Respondent - P086)

It is of interest to note that the shared, open, and glass walled nature of the room exposed some faculty members to seeing their colleagues teaching almost for the first time. In contrast to their experience in DL1, faculty members described the isolation that is traditional between faculty peers in regards to teaching practice.

"I think it's nice for me when I'm walking by it [DL1] and I'm not the one teaching and I can kind of see... just to see what other instructors are doing. 'Cause...I don't know what other people do in classrooms in our school, it's mostly closed off. It's beneficial as an instructor to see what other instructors are doing or what other students are doing with the glass wall, that's what you benefit from. And then maybe it also lets outsiders see what we are doing."

"And...you're part of this bigger building. You're not isolated. You can see that there's stuff going on. You're not just in your little classroom bubble. ...I think the overall effect of the small pieces of teaching and learning you can see, and in a very casual way, it doesn't have to be formal, like, "Let me go and observe your classroom." I can walk by in a minute and sort of go, "Oh, that's what they are doing in that class." ...or I see, "Oh, they're doing student presentations, that's kind of interesting." Or whatever. Just in a really quick, informal way you get information about how that space is being used and what other instructors use it for, which may also give me some ideas too."

(Faculty Interview Respondent - P096)

Video 11: Two Class Sessions at Once



This video shows an unusual occurrence; two formal class sessions meeting in DL1 at the same time. The class in the foreground is the Music Department

course for designing and building sensing electronic music interfaces we've seen earlier, the students in the background are from an Art & Design video animation course. The animation students are working in groups, setting up tripods and at times standing on tables, shooting stop-motion video frame by frame. They are spread throughout the back of the room (including a group working in the hangout area). In the foreground the music students receive a short session of faculty presentation, and then break up to go out into the building to conduct process observations, later returning to show and discuss their results.

The music class was scheduled in the space at this time. The animation course was not. However, the animation faculty member, familiar with teaching in DL1, was stuck on this day without an adequate space for his students to shoot this project in stop-motion animation. He approached the DL1 manager and the Music Department faculty member just before class and proposed sharing the space that day. In keeping with DL1's open approach, and recognizing this as an opportunity to explore the efficacy of simultaneous class use, they agreed to give it a try.

While simultaneous use that mixes class and non-class small groups or individual users is common, two simultaneous large programmatic uses, where at least one group might need to conduct some presentation or lecture-like activity, is not. There were two primary results this day: one, students in the music course, looking to conduct process observations somewhere in the building, encountered an unexpected opportunity with subject processes immediately available in DL1 to observe. Two, there was too much sound in the room and the music students, at first engaged in a short period of traditional faculty presentation, had difficulty hearing and attending.²¹

Active and Collaborative Work

"The larger group seemed to be planning out the logistics of a project. One continued to reference ping pong balls (he often held them up so the others could see). At one point, the girl in the group walks around to show the rest of the group a picture of an installation on her laptop. ... As the girl walked around, the group seemed to be impressed by the example she'd

²¹ A project researcher was observing in the room at this time and briefly moved to the front to try to observe any apparent distraction or difficulty in the music course. There were no obvious signs, though he noted the sound overlap himself. After the class session the music faculty member received email feedback from students indicating they had trouble hearing and were distracted.

found online. People said "awesome" and 'that's really cool.' ... I am wondering about the type of project or installation that they are attempting to create. It seems to involve soldering, drilling, lattice structures and the installation of LED lights."

(ND Research Observation - 2012-02-16)

"The first day of this class in DL1. [The faculty member] started with some general presentation points about design.... Then he moved on to the Arduino. ... After some slides ... [he] moved on to showing the programming environment. He asked the students to load the environment up on their computers (some are set up at unencumbered tables, some at iMacs). He continued to discuss the programming environment at the projector, writing a very simple program to light an LED. His slide included a diagram for the circuit. He mentioned the students "building the circuit" once or twice, and demonstrated his program downloaded to his Arduino. Then he asked, "So are your lights on?" Only then did the students fully understand that they were supposed to be active, that they really were supposed to be plugging an LED into their board, really writing and downloading the code into their board. They had continued to sit passively until this moment. There was a noticeable shifting, changing of mode, literally a lifting off of their elbows, swiveling their chairs, even some audible noises along the lines of "oh." There was movement then as some of the students realized they needed something they didn't have at their table. This was the first moment when this course changed (for the students) from a traditional passive course, to an active, hybrid-lecture-lab class."

(MB Research Observation - 2012-09-11)

Classes in DL1 were observed to devote a large percentage of their time to active, project-focused, student tasks with the faculty member playing a facilitator ("guide on the side") role. This active engagement did not generally take the form of discussion, but rather actual "making" activities around the creation of physical or virtual objects.

Video 12: Group Project Work with a "Guide on the Side"



In this video from the robotics class, student groups gather an extensive array of resources to their work tables: laptops, extra monitors, equipment bins with each team's robotics-specific equipment, hard drives, notebooks, etc., and are spread about the room actively working during a class session as the faculty member moves between groups. The session begins with a short period of presentation and then moves into making activity.

Video 13: Solo Project Work with a "Guide on the Side"

In this session of an inter-departmental class on the creative process, students are engaged in an active work session with the faculty member playing a consultative role on the side of the activity, moving continuously around the room and sitting and working with each student in turn. As in the robotics class, the session begins with a short period of faculty presentation and then breaks up into student work.

The student in the lower right, sitting on a beanbag chair, is using a large touch tablet, folding it up out of the way to use her laptop keyboard, then setting it back down over the keyboard to use the stylus. Students at the back right are practicing choreography, showing their work to the faculty member at one point and receiving feedback. A student at the front left is constructing a 3D object out of paper. Other students are working at computers constructing "virtual" artifacts of various sorts.

Students frequently convened in DL1 outside of class time as a central location for collaborative discussion, planning, or assembly work (even when primary project activity might occur outside of the space, such as in video projects shot outdoors, or making projects using wood or metal fabrication elsewhere). These collaboration sessions tended to occur in the evening or during the night when at least one of the students in the project had card key access and they were free to recast the space to their needs.

"The couch area was full; a project group discussing their work. I hear them planning a trip to Ragstock for costumes for their project, something involving filming, it seems. The group now works in two and three person sub-groups, sitting close to each other on the couches, leaning in close to look at the screens of their portables. They appear to be continuing to view and discuss costume possibilities. One of the participants I recognize from [a DL1] course. I don't recognize the other group members. One of them says, 'So, I'll email you guys with more stuff.' Many of the students from the project group leave at once, leaving two to continue working. They sit next to each other on a couch using one laptop together."

(MB Research Observation - 2012-02-02)

Video 14: The "Yellow Box" Work Group



This is the "yellow box" work group, so named by the research team because of the yellow boxes that would always appear in the time-lapse images as they worked. They met periodically in DL1 outside of any scheduled class time, starting in the late afternoon and working into the evening. They arranged themselves, the furniture, and computers as they wished to collaborate effectively, "owning," in effect, the front of the room while they were there. And always yellow boxes would appear in the last third or so of their work time. The boxes were pizza. Effective collaboration in long meetings, for this group, included pizza, as we might assume it would in any other less formal space. But in a campus "lab," allowing this freedom for student users to manage food and drink in the space on their own is something of an innovation which students reported to be important to their sense of comfort, identity (as responsible, trusted members of a community), and efficacy as they engaged in long work sessions.

Video 15: Whiteboardarium

Here students use self-constructed structures which we've dubbed "whiteboardariums" at the end of a long middle-of-the-night work session (another whiteboardarium design is also visible in the earlier "Montage" video). Of note in this video is what the students do at the end: They put the whiteboards neatly away. They are unmonitored, in the room by themselves at 3 am (though, admittedly, under card-key access so their presence is logged), doing what they need to do to adapt the space to their needs, and when they are done they neatly pack up and leave the room much as they found it.

A Resource-Rich Environment

"DL1 seems to have no limits. What has not already been calculated into the grid of the workspace is always up for consideration by the staff. It provides accessibility to equipment and programs that I would otherwise not have access to, and a very comfortable work environment. It becomes a place for chance meetings and encounters with faculty and staff that results in productive advice and feedback."

(Student Survey Respondent - P063)

"I mean, it is super geared with stuff to make circuits, and T-squares, and rulers, and a nice drafting table, and two Cintiq tablets that you can doodle on all day, and at least ten [computers] that have up-to-date software for today's technology, as well as a huge screen projector that I wanna watch movies on all the time, and a projector that's hooked up to a nice computer, so you can do all those things and tell people how to do them while they're on their computers, and outlets, and beanbag chairs, and really comfortable couches, and white boards that are everywhere, and markers that sometimes don't work, but they do the job anyway. And people find their quirky little spots [to work] in that place."

(Consultant Interview Respondent - P036)

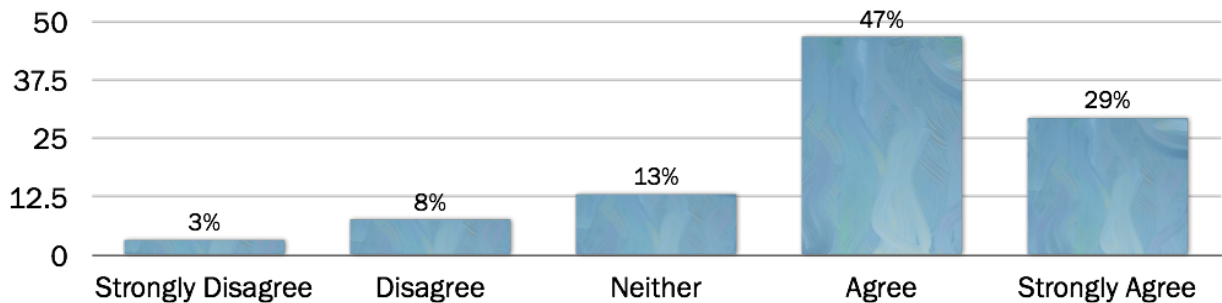
DL1 contains carefully tailored collections of software and other resources "traditional" for particular, targeted,²² fields and student populations, along with more specialized and unique hardware and software for these fields. The targeted fields represented in the room at any one time cross a variety of discipline boundaries, and resources are mixed in the space. This creates natural opportunities for individuals to be exposed to tools from other, possibly related, fields as well as to more sophisticated tools from their own field than they might otherwise experience.

The range of different types of resources gathered and used in one space in DL1 is unusual. Unique load set resources might include software for video editing, animation, 3D modeling, audio editing, specialized programming environments, etc. Physical tools and resources might include stylus sensitive large screen editing displays, stylus tablets, "green screen" filming technologies, various projection and video display resources, motion tracking devices, soldering and other electronics assembly tools, helmets for sensing electrical neural activity,

²² Fields and populations targeted are defined by, the then current, users of DL1. These targeted populations change from term to term as user populations change.

scrap material, hand tools, miscellaneous electrical components, etc. In this context the possible interactions of use across these resources cannot be fully predicted or planned for, and users frequently find their own path through the possibilities.

Figure x: Survey Responses - "DL1 has resources I can't find anywhere else."



"DL1 is providing me with me with very expensive load set and many of them are very professional tools that are used in the real world, which is invaluable."

(Student/Consultant Interview Respondent - P087)

The range and variety of specialized, tailored, and in some instances, advanced technical resources available to users, as well as the physical and cultural flexibility of DL1, allowed pedagogy in which project work could closely approach authentic work. One faculty member described the resources he was able to bring into use there, and the sophistication of the project work integrated into his DL1 course, as providing the authenticity to help identify students to participate in his "real" research lab.²³

DL1 also contains a seemingly random assortment of objects that often become useful components in emerging projects. Some of these, as mentioned above, are traditional, though specialized, resources for particular fields. Some are more peripheral, and consist of hard-to-classify workshop-like objects and consumables left over from earlier projects (scrap both high-tech and low). The

²³ Faculty Respondent P107

community context, and the conversations within the community which wrap around these resources create an awareness that helps manage, suggest and support their subsequent use, as well as protect them from theft or intentional damage.

Video 16: The Very Large "Scrap" Roll of Heavy White Paper



This video shows the robotics class and the large, white roll of paper they used as a track for one of their project-focused assignments. This paper was left over material, scrap tucked away in the rafters of the room (the light bars visible at the top of the image) for a year or more, until the faculty member for this class was looking for something to provide a driving surface. Conversations within the room led to the paper, and the class then adopted it a central resource, tucking it near the front of the room for easy access and rolling it out for each class session, as well as for individual project team work outside of class time. After this portion of the course was complete, the paper went back into storage for possible future use.

Video 17: Programming a Motion Tracking Device



Here a student is working by himself programming a DL1 provided Microsoft Kinect motion tracking device, standing up frequently to wave his arms and kick his legs in front of the Kinect, then sitting down again to work on the program.

The DL1 community emerges in the data as a powerful resource. More than just the presence of student consultants and other staff, this reflects the cultural accessibility of all users, resulting in a substantial opportunity for peer-to-peer ad hoc interaction for problem solving (where there are a lot of "people around who have differing expertises"²⁴), as well as in opportunities for presenting and sharing interesting and inspirational work. Approaching someone in DL1, even someone you don't know, to ask "What is that you're working on?" is accepted, and even welcomed, behavior.

"So there are different people working on different projects and they all need to be in that space because that's where you can be dirty and noisy

²⁴ Student Interview Respondent - P054

and the tools are there and that sort of thing. And then, someone can have a problem and someone over there has an answer or someone here just needs an extra set of hands to hold something, lift something, and move something."

(Faculty Interview Respondent - P091)

"I've gotten a lot of advice from random people in there too, and it's been really helpful to kind of like get past a brick wall that I could not figure out and they had a really simple solution for it. So I actually sometimes just go in there if I'm stuck and kind of see what happens with people, or just like walk around and see what other people are going to do."

(Student Interview Respondent - P093)

"I feel like it is more "fun" and welcoming than other labs on campus- it is inviting and the openness of it promotes people in the space to interact and while at first I felt uncomfortable doing that, I felt more supported by those around me when working in DL1. As if I could just sort of ask a question to the room and someone would be able to help me/voice their thoughts."

(Student Survey Respondent P065)

The sense of community as resource extends as well to the family of facilities grouped under the DMC (of which DL1 is a member). These staffed labs and studios, physically next to each other and grouped under the same administrative structure, create a community of staff members familiar with each other's facilities and available and present to work across boundaries. For many users, particularly those who continue working in DL1 after their initial course experience, DL1 is one resource among a set of closely related resources, and they draw from each, and move from one to the other as their work dictates.

"...it's the placements of the room next to other things that matters. I think it's such a big deal. I mean you can get so much more done when stuff is close together."

(Student Interview Respondent - P052)

"...everything just kind of connects with each other, like media from GroundWorks or like equipment from GroundWorks, you know, it comes into here and it is used on the computers or something like that or like there's the 3D Lab for like consulting [for] the Maya software that we have in here, that sort of thing, or the video studio, also. A lot of video studio

footage is seen on these [DL1] screens."

(Student Consultant Interview Respondent - P054)

A Community-Infused, Inhabited Environment

Survey Question 36: What do you like about DL1?

"The people. It's the people you meet at DL1 that makes it enjoyable. Again, people there are working on things they're into/love. It's great to be around people who have that attitude."

(Student Survey Respondent - P032)

"The people...are often an unexpected plus. Even though I'm not going there because I think they're going to satisfy some need, there is always the possibility of something interesting, unexpected, it is always there and I think that's why there is always one little antenna that's up, kind of paying attention to things that are going on in the room."

(Faculty Interview Respondent - P091)

DL1 is as much a human, cultural construct as it is a purely architectural, technological and programmatic one. People like DL1, people are comfortable in DL1, people choose to inhabit DL1 outside of times when being there is necessary, and they view it as an inhabited space. Users report feeling trusted as members of a (somewhat exclusive) creative community. The room's one posted rule--hanging on a 14-foot banner above the glass wall and always discussed in formal introductions--is "Say Hello." While individual users connect with this message to varying degrees, it is strongly reflected in the broader culture.

Q30: Do you say hello to others in DL1?

"Yes, because often times they're working on things I find interesting and cool."

(Student Survey Respondent - P057)

"I love that it is interactive, I love the space and the people that end up there. Also, though some people might not agree with me, I like that it is somewhat exclusive to people who have access to the classroom. It means that you either have a class there that is using the interactive space, or that you have taken initiative to get access to DL1 because you like the space."

(Student Interview Respondent - P058)

Video 18: A View of Community in DL1

This time-lapse video was captured from a corner of the hangout area, looking out into the center of the room and across to the area with the projection screen. A class is visible in session (nearer the projection screen) while a great many other people enter, work, and interact in the space. As one faculty member said, "[DL1] is a beehive of activity."²⁵ Those visible here include a faculty member (stopping in outside of class time), students from other classes, "expert" students (who choose to spend extended periods of time in DL1 and who come to participate nearly as staff members), DMC student staff, and DL1 student and permanent staff. The borders and boundaries between these types of users are fluid, frequently crossed, and sometimes hard to discern.

Student Respondent P092: "I've had people asking me questions while I was working in there by myself...on a project, other people will ask me 'How do you do that?' ... And then I'll explain it real quick. So it's fine, it

²⁵ Faculty Interview Respondent - P088

never annoys me or anything. I'll be, 'Yeah sure, I'd be happy to help.'"

Interviewer: "Do you think they think you're a member of the staff?"

Student Respondent P092: "I doubt it."

Student Respondent P022: "That's what I always thought. That the people in there were members of staff.... I felt like they were a part of the student staff."

Student Respondent P092: "It's sort of like Cheers, like they have regulars, you know. And there are people in there that you just see all the time...."

(Student Interview Respondents - P092, P022)

The continuously accessible, inhabited (and somewhat messy) “live” nature of DL1 is distinctly different from neat, carefully monitored and constrained, “defended” learning environments (which may also be closed and locked between scheduled activity). DL1, in this sense, is an undefended space, meant to be adopted by users who take some ownership and responsibility for it in return for control and flexibility and open access where they are trusted as responsible members of a shared community. The data support the idea that this distinction was noticed, and highly valued, by both students and faculty, and that it contributed to their sense of efficacy in the space.

"The staff lets us use the room the way we want to, it's awesome. It makes me feel my age. I don't know how to say that, really. I am 20 now. It makes me feel like, 'Okay, I am an adult. I can do what I want with this within reason but I can come in here and I can manipulate this room so that I work better.' It's kind of a selfish thing. It's about me and I get to do what I want to do. And it makes me feel like I'm in college or... I don't know how to say it really."

(Student Interview Respondent - P092)

Design Implications

Extreme User-centered Design

DL1 was originally created to encourage the growth and development of an a-disciplinary but definable academic community that was emerging with no physical location to inhabit. At the time, it was impossible to know what furniture or equipment would be useful, what staff skills would be desirable, or even what lighting would be appropriate for activities that would quickly move from current technology to unknown technologies of the near future. The practical solution was to design for the abstract good of the current community itself, primarily by empowering its members to control the content of the environment. Therefore administrative resources were devoted to programs and practices that would accomplish an essential shift in users' expectations: to persuade them to become active participants in the responsive evolution of the space, not just survey respondents. The participating community and the administrative support program consequently developed dynamically, gradually discovering efficiencies and practices that continue to evolve each semester.

This practice represents an ongoing design process that starts with actual use, in which nothing is sacrosanct and in which change is expected and valued. Evolution plays out hour-to-hour as participants gather resources for their immediate needs; day-to-day as artifacts of their work affect the environment; and term-to-term as they propose new resources and reject or recast resources falling out of use. Students, faculty members and staff members collaborate in exploring the possibilities and challenges of these transitions, and in finding workable implementations, including sharing costs and responsibility for new tools and materials. In effect, finally: the expectations and aspirations of participants who choose to use DL1 are both a reaction to what they find there, and the primary driver for what DL1 is, and becomes.

Design to Encourage Risk-taking

DL1 shares some characteristics with established contemporary learning space approaches, such as SCALE-UP,²⁶ TEAL classrooms,²⁷ Active Learning

²⁶ <http://scaleup.ncsu.edu>

²⁷ <http://icampus.mit.edu/projects/teal/>

Classrooms,²⁸ and TILE classrooms.²⁹ Some of these common characteristics include:

- Physical layouts that do not enforce traditional many-to-one faculty focus and which support greater equality in interactions
- Physical layouts intended to support group interaction
- Focus on active student roles
- Increased sharing of responsibility and control within the space (increased student control of their own learning)
- Ease of movement throughout the space
- Physical comfort (comfortable chairs, carpeting, etc.)
- Ubiquitous access to computer-based tools, networks and displays, as well as whiteboards and other non-virtual shared writing/drawing surfaces

Characteristics of DL1 which differentiate it from some of these learning environments include:

- Hybrid lecture-lab environment which supports active "maker" activity as well as abstract presentation effectively in the same space (and nearly at the same time)
- Constantly evolving and changing environment which is universally flexible due to non-fixed (literally rolling) furnishings and resources and a culturally/administratively philosophy that is explicitly open to varying users, uses, and modes of use.
- Simultaneous use by different groups and individual users
- Other's work is visible and frequently persistence in the space
- Exposed to an external community (via a very public glass wall)

²⁸ <http://www.classroom.umn.edu/projects/ALCOverview.html>

²⁹ <http://www.classrooms.uiowa.edu/TILE.aspx>

- Staffed and inhabited space in which use continues between and around more formal programmatic activities, such as courses, to the point where the space has a persistent culture distinct from that of any of its individual user groups or programmatic uses (in essence overlaying these)
- A large degree of user (particularly student) access and control over the space engendering a sense of responsibility and membership, and substantively supporting adoption of the space outside of programmatic use times as a personal resource (which in turn contributes to the development and persistence of an inhabited, trusting and trusted, culture in the room)
- 24 hour card key access for students
- An informal space
- Periodically messy environment in which work might remain "out" while in process and in which adaptation and accommodation to a diverse range of other's activity (either in physical or digital form) is expected
- Embedded, as a member, in a close community of other staffed active making spaces and resources (the other labs, facilities, and studios in the DMC)

These distinguishing characteristics of DL1 share a tendency to support risk-taking on the part of both users and administrators.

As a constantly evolving space, originally implemented, in essence, unfinished, and continuing to change as a programmatic expectation (if not goal) it presents unique challenges to processes of staff and resource allocation and planning. If the space is in fact responsive to (changing) user needs and innovations, then, by definition, it will not necessarily conform to prior projections and plans created by its own administrators. DL1 becomes an (at times humbling) lesson in administrative improv³⁰ and a challenge to traditional planning.

³⁰ We use this shortening of "improvisation" intentionally to borrow a flavor from the improv of theater, where extensive training, practice and preparation are put to the service of adapting to change, and previously unknown circumstances, on the fly in very a public context. Such improvisations require much more dedication and preparation than is visible, and are more difficult than they appear.

Individual risks for users are of a more personal nature involving the challenge of less control inherent in a shared context, of being exposed and visible while working, while experimenting and while creating, of a somewhat unpredictable and changing cultural context. However, this risk is acceptable, and even welcomed by users (and reported to be an influence for productive inspiration) in a context which is grounded in a sustainable and sustaining culture which expects precisely this and which is open to failure. Again, the reference to improv (in a theatrical sense) is appropriate: in a space in which exposure, diversity, and active engagement are the norm and are shared with others, it becomes easier to be exposed, to be active without fear of how failure (a natural step in the process of creative making) will be viewed, and to engage with a diverse community. It is this improvisational, risk-taking, and risky culture of openness, evolution, and connection between users that most defines DL1 and its ability to support effective, authentic learning and engagement.