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# What Teaching Looks Like

Higher Education through Photographs

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#### **4.01**

*Students watch a video in a medical ethics class at an associate's institution.*

## CHAPTER 4

# **The Physical and Technological Environment**

## *The Where and How of Teaching*

The classroom, with all its limitations, remains a location of possibility.

—bell hooks (1994, 207)

Learning activities are always about more than the space; and space is always about more than just the learning activities that go on in it.

—Jos Boys (2011, 85)



## Compromises and Collisions

In higher education, few topics will start a heated discussion as quickly as parking, space, and technology. Parking is beyond our scope, but space and technology figure prominently in the photographs of *The Teaching and Learning Project*. While US higher education headlines over the past decade highlight large private donations and the new buildings, classrooms, labs, and technologies they have made possible, Martin rarely photographed in brand-new spaces. He did not set out to avoid them; they simply weren't dominant in the project's sampling of classes, meetings, and events. The contrast between shiny new campus spaces—prominent in press coverage, fundraising, and admissions materials—and the long-deferred maintenance, much-needed upgrades, and hodgepodge nature of behind-the-scenes classrooms and offices (Marcus 2016) is reflected in the photographs.

Despite these contrasts between new and old, the message in the images is predominantly not one of limitation and decline. Rather, I come away with appreciation for the complex interplay between spaces, technologies, and the people who teach and learn with and within them (first-person statements in this chapter are in reference to Cassandra Volpe Horii). The choices that instructors and students make together to challenge apparent constraints and create the kinds of environments and interactions that foster deep learning and collaboration are particularly compelling.

Higher education, though, can get a little stuck thinking that outdated spaces and technologies mean nothing has changed. A particular mid-fourteenth-century illustration that has been included in many lectures, blogs, theses, and publications on the state of modern education is a ready example (e.g., Pinkerton 2016; Vikberg 2012; Bates 2019). Apart from the robes, hats, parchment, and quills, the illustration has become an icon of sorts because of its familiarity: in it, a professor speaks from a podium to university students in the tiered rows of a

lecture hall; some pay rapt attention, while others appear to have dozed off, become distracted by personal technology (their parchments and quills), or started chatting with one another. The illustration is often used to make the point that higher education is painfully slow to change.

Certainly, we find examples of all these familiar tropes in photographs of college and university classrooms—you will see them, too. But these familiar clichés are not the whole story. We also see teachers and students adapting and altering expectations for and uses of classrooms and technologies in ways that range from mundane workarounds to inspired innovations. We see the visual traces of the relationships between teaching and learning, and the physical space and technologies in and through which they occur, defined by “compromises, collisions, and unexpected outcomes” (Boys 2011, 35). More than anything, we see a future in which educators and learners deliberately embrace the possibility of entering learning spaces together, be they physical or virtual, with mutual transformation in mind.

As you encounter the photographs from a variety of postsecondary teaching and learning settings that follow, consider what aspects of space and technology stand out to you; how the people in them appear to use, adapt, or adapt to them; and to what extent they seem to support or hinder teaching and learning.



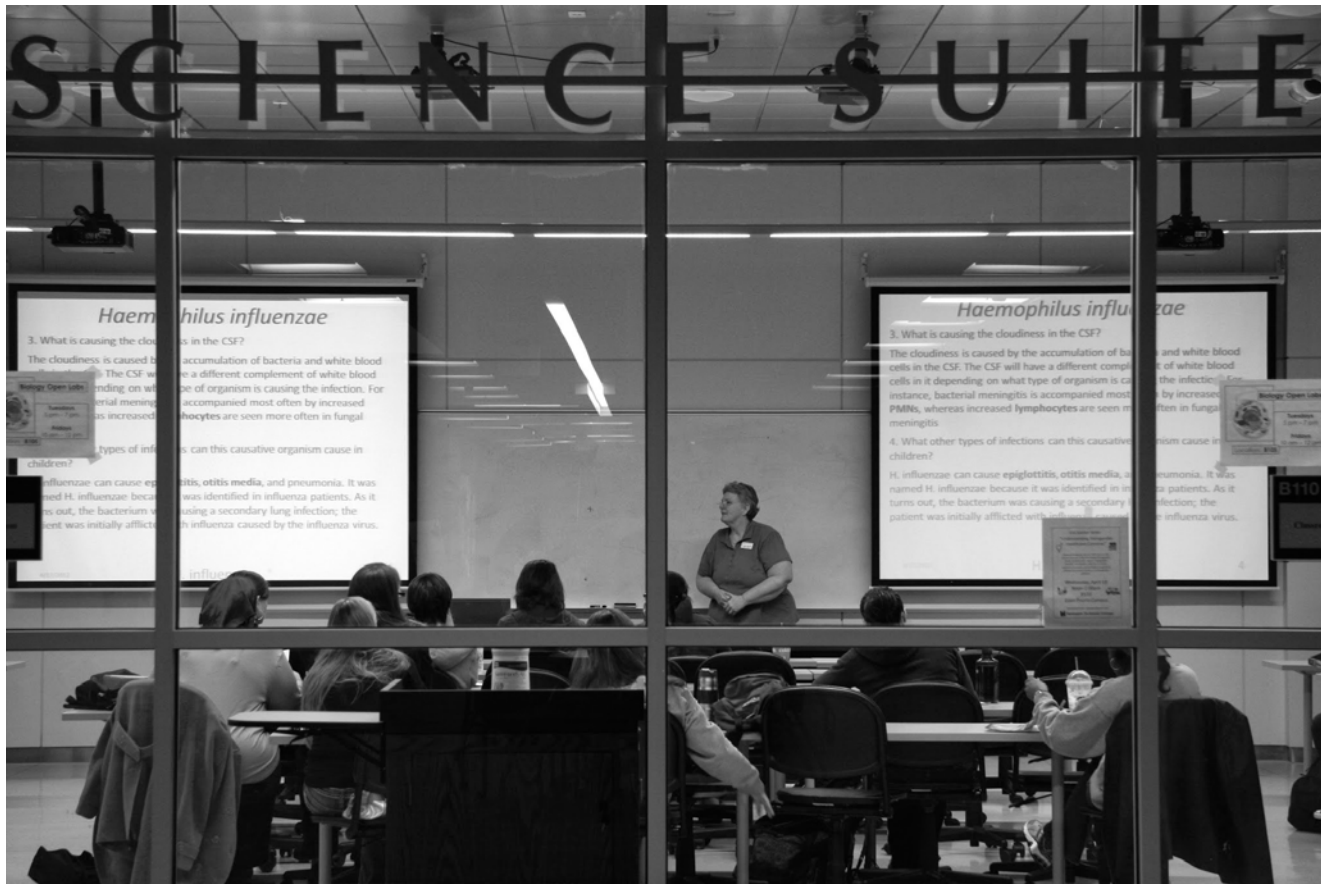
#### **4.02**

*A faculty member in chemistry speaks to students in a chemistry class at a baccalaureate institution.*



#### 4.03

*A faculty member in mechanical engineering gestures to her presentation in a thermal science class at a doctoral institution.*



4.04

A faculty member in biology speaks with students during a biology class at an associate’s institution.



**4.05**

*Students in a religious studies class at a doctoral institution track a presentation projected to multiple locations in the classroom.*





**4.06**

*A graduate teaching assistant works with students during a physics recitation section at a doctoral institution.*



**4.07**

*A graduate student leads a chemistry study group at a doctoral institution.*



**4.08**

*A faculty member in art demonstrates a technique to a student in a drawing class at an associate's institution.*

## Learning Spaces

Some learning spaces convey their purpose at a glance. In addition to painted and printed titles labeling rooms by department, we find easels in studio art, mineral specimens in geology, music stands in performance, and Bunsen burners in chemistry. In some cases, such as the science suite in image 4.04, the glass-walled classrooms also communicate institutional values and goals: the physical transparency of the learning space allows anyone walking by to view the activities, people, and learning happening inside. Creating a transparent space, it is hoped, leads to a transparent educational experience, in which students have ready access to learning opportunities, an understanding of their purpose, and an ability to see themselves doing science (Winkelmes, Boye, and Tapp 2019). But learning spaces are not obligated to tell us what they are for or why they matter; rather, educational spaces and the people who teach and learn within are in two-way relationships. Put another way, “we make the space and the space makes us” (Doorley and Witthoft 2012, 158), or in recent architectural thinking, “meaning-making occurs through the activation of space by our bodies . . . space and its occupation are not separate or in a behaviorist stimuli-response relationship, but endlessly informing and influencing each other” (Boys 2011, 6).

A ubiquitous kind of higher education space, the lecture hall, allows us to explore such relationships. An auditorium with fixed seats in rows, all facing forward, conveys certain structural messages: the teacher is in charge; students’ attention belongs at the front of the room; students generally stay seated and have little need for interaction. Such messages can be as frustrating for teachers as they are oppressive for students. One STEM instructor at a bachelor’s institution felt trapped: “I’m limited in how far I can move because of the setup. I spend a lot of time at the podium because that’s where the computer is. . . . The little slice of chalkboard between screen and podium is where I do most of my writing.” An-

other STEM professor from a doctoral institution put their frustration this way: “From the student’s perspective, I’m dwarfed by the slide and screen. In my mind, I always think ‘there’s the professor.’ In reality, ‘there’s the slide!’ . . . I hate it for teaching. It looks like a movie theater—big screen, passive learning. . . . Ideally, it’s less about me and more about students interacting.” While fixed seats and huge screens may not communicate an educational ideal, in *The Teaching and Learning Project* photographs, what instructors and students decide to do in a space often dances with such expectations in unexpected ways—sometimes in alignment, sometimes at odds, rarely static. As you view the next group of images, notice how teachers and students work within and around the messages conveyed by the space: are they conforming, rebelling, or adjusting? How can you tell?



#### 4.09

*A faculty member in chemistry annotates a presentation during a chemistry class at a doctoral institution.*





**4.10**

*A student in the back of a chemistry class at a doctoral institution raises a hand to ask a question.*



**4.11**

*A faculty member in chemistry engages students in small group discussion during a large chemistry class at a doctoral institution.*



**4.12**

*Students in a large chemistry class at a doctoral institution engage in small group discussion.*

The question of our physical presence—of human bodies together in a room, for the purpose of learning—is an important one. How we position ourselves and relate physically in classrooms carries and creates meaning, value, and power. As bell hooks reflected:

Teachers may insist that it doesn't matter whether you stand behind the podium or the desk, but it does. I remember in my early teaching days that when I first tried to move out from behind the desk, I felt really nervous. I remember thinking, "This really is about power. I really do feel more 'in control' when I'm behind the podium or behind the desk than when I'm walking toward my students, standing close to them. . ." Acknowledging that we are bodies in the classroom has been important for me, especially in my efforts to disrupt the notion of professor as omnipotent, all-knowing mind. (1994, 138)

In *Teaching to Transgress*, hooks shared these thoughts in dialogue with philosopher Ron Scapp, who responded to the idea of teachers occupying space in less hierarchical ways: "You bring with you a certain kind of potential. . . . As we come physically close, suddenly what I have to say is not coming from behind this invisible line. . . . As people move around it becomes more evident that we work in the classroom" (138). Moreover, we engage in shared work in the classroom, teachers and students alike—a quality that contributes to the classroom as "a location of possibility" (207).

Take another moment to sit with the images on the preceding pages. What do you feel when the professor is far away and students are passive? When she is close by and engaged? When she is somewhere else, and students' peer-to-peer interactions are in focus? Certainly, the room, along with the technology, shaped aspects of what happened in this classroom, but the temporary occupants have also found ways around and between its constraints, arranging themselves to

engage, learn, and subvert some of the expectations about teaching and learning built into the space itself. (Note that photographs 4.09 – 4.12 and associated prompts for observation and reflection are included in the online resource “[Close Reading and Observation Exercises](#).”)

On college and university campuses today, the act of “breaching” (Boys 2011, 173) the apparent expectations of the physical space holds particular significance. Evidence about what forms of teaching best promote learning in higher education has grown markedly over the past several decades. From an educational research perspective, it is now clear: well-implemented teaching methods that engage students in some form of interactive or collaborative work in the classroom—on their own or interspersed with segments of lecture—tend to result in increased learning, often with quantitatively larger benefits for marginalized students, such as those with identities and backgrounds disproportionately excluded from higher education (Theobald et al. 2020; Freeman et al. 2014). Researchers propose a variety of mechanisms for the documented effectiveness of this family of active learning methods, including helping students connect new learning to what they already know, prompting students to practice recall and application of concepts, and enhancing a sense of belonging (Ambrose et al. 2010).

Over the past several decades, colleges and universities have been designing and building some classrooms with active learning in mind; these spaces often have moveable tables and chairs, allowing student groups to gather around tables facing one another. They may not have a single, fixed room orientation, and they allow teachers to move among groups of students. But research suggests it is not the space itself that improves learning; rather it is what happens inside that matters (Stoltzfus and Libarkin 2016). That is not to say that learning spaces are inconsequential; in fact, room setup may contribute to shifting teachers’ methods and beliefs, as well as to institutional efforts to change the overall culture of teaching and learning (Talbert and Mor-Avi 2019). Whether supported by the



format of the learning space or in contrast to it, the choices of the people in the learning spaces are crucial.

Due to the relatively long lifetime of built environments like classrooms, instructors and students entering today's and tomorrow's learning spaces, redesigned or not, may need to work purposefully against the physical forms and arrangements that they find. Moreover, during a day in the life of a typical college classroom, a single room may host lectures, discussions, student group projects, adjunct faculty office hours, student club meetings, and faculty or administrative committee meetings. It will host these functions regardless of what is inside, and

#### 4.13

*A faculty member in mathematics assists students during a large mathematics class at a doctoral institution.*



except for those classes with specialized or unique equipment, how the room is used will be based largely on the implicit or deliberate choices of people who attend.

Borrowing a term from computer science and popular culture, chemistry professor John Pollard found purpose in implementing intentional classroom “hacks” at the University of Arizona. Starting out, Pollard tried to implement active, collaborative strategies in crowded lecture halls, but found that the “classroom space was working against me.” When trying to circulate among students, he and the instructional team could not interact with most of the students due to the layout (John Pollard, interview with author, December 7, 2020). Pollard worked with colleagues on campus to find alternatives and ended up collaborating with the library, technology support, the teaching and learning center, and the provost to take over a large, open space with temporary equipment and pilot a new format. Echoing bell hooks’s reflections, Pollard describes his early days teaching there:

I brought my entire class in there one day; there were pillars with temporary monitors on them, rented round tables everywhere, and screens set up around the room. I remember the first day of class in that space—it was such a different experience to be in the center of this huge group of students. I put the microphone on and remember feeling very uncomfortable, thinking “this was a bad idea,” but it worked well. The ability to sit at a table with students, to be on the same level, completely changed my engagement with students. It’s like eating together and having a great conversation that you don’t want to stop; it has transformed what it means to gather students together. (Interview with author, December 7, 2020)

Pollard’s creative ways around the limitations of traditional learning spaces sparked enthusiasm for changing not only classroom methods, but the entire



undergraduate chemistry curriculum. The institution eventually took note of the impressive results and created over forty redesigned active learning classrooms (Talanquer and Pollard 2017). Pollard explains the long-lasting impacts on teachers, too: “Space matters. It’s been the most effective and transformative tool to help faculty move toward evidence-based instruction. Suddenly instead of working against you, the space is working with you” (interview with author, December 7, 2020). Changing the space does not lead directly to changes in teaching, but rather, an array of complex interactions; altered learning spaces may express changing beliefs of teachers and students, advance commitments

#### **4.14**

*A faculty member in music conducts during a music class at a doctoral institution.*

to equity and inclusion, mobilize interest in exploring educational approaches, and support long-term adoption of new methods, even in the face of challenges (Knaub et al. 2016; Mulcahy, Cleveland, and Aberton 2015; Strijbos, Kirschner, and Martens 2004).

Through photographs of learning spaces, we have started to see them not so much as the walls, chairs, items, surfaces, and arrangements within, but as starting points for choices made by instructors and students together. The process of re-designing learning spaces is as important as the results.



#### 4.15

*A faculty member in applied behavior analysis at a doctoral institution conducts a discussion-based class outside.*



#### 4.16

*A faculty member in sociology conducts a class in an outdoor courtyard at a doctoral institution.*

## Connecting through Technology

Technology can be novel and exciting, even in higher education, but at the core it should be useful. Postsecondary instructors may have access to a wide variety of things—ranging from physical items like erasable chalkboards and whiteboards, to digital devices like computers and tablets, to online applications and platforms like learning management systems and simulation software—each with characteristics that enable and even prompt certain kinds of usefulness when employed to support learning, sometimes called “affordances” (Strijbos, Kirschner, and Martens 2004). As Derek Bruff aptly put it, “We should be intentional in how we use technology, looking for ways the technology can support student learning” (2019, 2).

We see in the photographs of *The Teaching and Learning Project* examples of classroom technological environments that are layered and nuanced. Sometimes, frankly, they’re a mess—dangling and tangled cords, old-school overhead projectors next to high-tech digital screens, and different generations of technology in the foreground and distance, with ubiquitous coffee cups and water bottles regularly endangering old and new devices. In one of the images that follows (4.17), a student works at a chalkboard while referring to a smartphone. Did the instructor ask students to bring their smartphones to the board? Possibly, but it seems just as likely that the chalkboard was there, a built-in technology well suited for simultaneous collaboration, display, and spatial arrangement of many concepts and ideas, and smartphones were a familiar way of accessing information beyond the room. Teachers and learners use what is intuitive and familiar in new combinations to get the job done, sometimes resulting in unexpected and seemingly awkward arrangements that nevertheless work.

In contrast, instructors may tend to avoid trendy or flashy classroom technologies that are too fussy and difficult to use in real teaching life. One institution

I know installed smartboards, combination computer and whiteboard devices mounted on walls, in dozens of classrooms, at not a small cost, and found that few instructors used them because they were hard to set up and operate—a pattern others have observed as well (Boys 2011, 97). Recall Lee Shulman’s reflections on the complexity and near impossibility of teaching discussed in chapter 1, then add a finicky computer, a touch panel with multiple views controlling lights, screens, inputs, and outputs, and some new and unfamiliar software; it is easy to feel the potential for instructor and student overload. Attention is a commodity, and given the importance of focusing on student learning, we understand why technology use may be driven by what works most easily and reliably. For new technologies that have compelling features but take significant practice, instructors benefit from play spaces, both physical and virtual, away from students and outside of the teaching term, ideally supported by training, guidance, and access to instructional design and technology experts to answer their questions.

What we love the most in these learning-teaching-technology images are the moments where students are connecting over, around, and through technology. The reality in college and university classrooms is that students bring what they have, including different brands and models of phones, tablets, and laptops; instructors must be ready to make whatever learning activities they have work with that great variety, and institutions should provide technology to students who need it. As discussed in chapter 2, emotion plays a crucial role in learning; in order to be useful, technologies must be able to facilitate not only exchange of information, but also students’ “affective encounters” (Boys 2011, 91). We often see sheets of paper—notes, worksheets, scratch paper—lending their reliable surfaces, ready for annotation and easy sharing alongside digital technologies.

As you interact with the photographs that follow, images 4.17 – 4.21, take special note of the technologies that you find in the foreground and background alike, how they are employed by students and teachers, and the connections be-



tween and among learners and instructors that you observe. (These photographs and prompts are included in the online resource “[Close Reading and Observation Exercises](#).”)



**4.17**

*Students share key points from a group discussion during a women's studies discussion section at a doctoral institution.*



**4.18**  
*Students use clickers to  
anonymously respond to  
questions during a physics  
class at a doctoral institution.*



**4.19**  
*Students engage in various ways during an economics class at a doctoral institution.*



**4.20**  
*Students engage in small  
group work during a  
chemistry class at a doctoral  
institution.*



**4.21**

*Students work together during an information systems and technology class at a doctoral institution.*



## Distance and Disruption

My perception of these images has shifted since COVID-19. As campuses with significant in-person educational programs, including my own, moved all teaching and learning online, some of our most taken-for-granted technologies when on campus became our biggest challenges. In particular, the ease of working together on a shared surface (paper, chalkboard, screen), concurrent with the immersive communication of in-person interaction, was especially difficult to recreate with available online tools. We patched together software and equipment, shipping items to students and arranging no-contact pickup for instructors as needed; we were fortunate to be able to do so, as this financial investment was not feasible in all institutions and regions. Students turned to non-educational messaging and collaboration platforms from business, video gaming, and other sectors. Training for and discussions among instructors prompted sharing practices among many who had never before taught online. We found a way, but with far fewer of the affective encounters that make postsecondary learning the textured, supportive, and immersive experience we know and want it to be.

Of course, teachers have been teaching and students have been learning online for decades; the key disruption due to the COVID-19 pandemic was that, suddenly, the great majority had no other choice. In 2018, 35% of the over 19.6 million students enrolled in degree-granting postsecondary institutions in the United States took at least one distance course, typically delivered via online technologies (NCES 2019a, table 311.15). As colleges and universities are notoriously slow to change, going from about one-third of students studying some online to well over three-quarters of students studying mostly or completely online during the pandemic (Hess 2020) is an epic shift. Because online courses were historically offered less by some institutions than others, this change also caused institutions that had few or no online offerings before the pandemic to

suddenly spin up the infrastructure to function fully online (Burns and McCormack 2020). It also means that quite a few faculty who had never taught a fully or partially online course did so in 2020–2021 (Lederman 2019, 2020).

The photographs of *The Teaching and Learning Project* explore various modes of distance learning, including those in the next group of images (4.22 – 4.26), which show courses with remote participants joining via videoconference and instructors teaching online from home, alongside their families, pets, and household activities. However, the full range of experiences with online education is not shown; these photos sample relatively privileged remote and home environments with adequate technology and internet service, which is not the case for many students and is an ongoing barrier to equity (Lederman 2020). As you contemplate these photographs, we ask you to hold in your mind, too, what is not in the frame: parents of young children, who may need to teach and learn from home while caregiving; students lacking personal computers; students with inadequate internet at home, struggling to access courses on mobile phones, sometimes studying in parking lots near free Wi-Fi signals. The downsides of distance education's flexibility and access include distraction, burnout, and inequity.

*The Teaching and Learning Project* photographs could inform the development of new educational technologies, as they highlight the distinct need for affective, personal connection. We need, for example, technologies that enable better eye contact during videoconferencing, applications that support multi-stream collaboration without forcing a choice between sharing emotion and sharing content, and ways to interact online that give participants the feeling of being part of a community, rather than the isolation of appearing as one of many tiny boxes. Those and other functions also need to be accessible across commonly used platforms, without expensive add-on equipment; until internet access becomes universally available regardless of income or geography, they must also not rely on excessive bandwidth. In a world where postsecondary teaching may

be interrupted by natural disasters, more frequent severe weather due to climate change, and outbreaks of disease, knowing that teaching and learning can continue through adequate, effective technologies is more critical than ever.



**4.22**

*A remote guest speaker joins a communications class at a doctoral institution.*



#### 4.23

*A faculty member in management at a doctoral institution prepares for students in her project management class to collaborate remotely with students from another institution.*



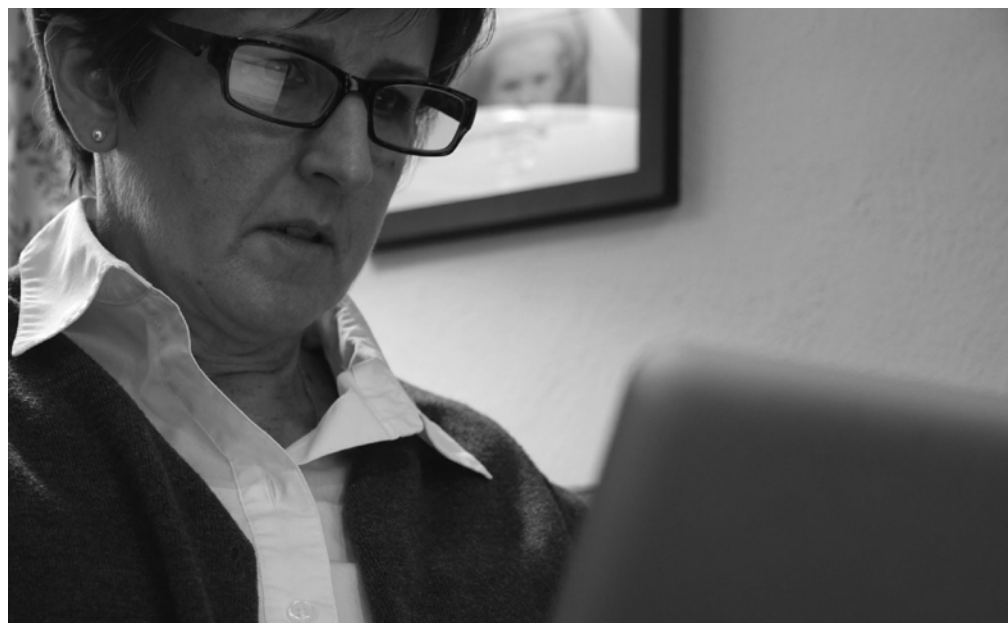
**4.24**

*A faculty member in business administration at a master's institution teaches online as her son works on his homework.*



**4.25–4.26**

*Sequence of two photographs: A faculty member in business administration at a master's institution teaches online.*



## Unstaging the Future

*The Teaching and Learning Project* encountered several spaces purposely made to stay unfixed, raw, and changeable, with elements designed to be transformed over and over again with and by students and educators. These spaces open up a potentially powerful vision for future postsecondary teaching space and technology.

Unlike the active learning classrooms discussed earlier, these rooms not only have moveable tables and chairs, but often have reconfigurable walls and partitions, feature flexible vertical and horizontal display areas for students' work, and may be set up with zones for different kinds of learning activities such as discussion, individual or small group work, use of computers or other equipment, and extended forms of physical making and exploration through models, artifacts, experiments, and prototypes. In the photographs that follow, images 4.27 – 4.31, these unstaged spaces were used for graphic design and architecture classes, though I have also been involved in the use of unconventional, blank slate learning spaces to explore new formats and modes of teaching in the social sciences and STEM fields, and they may be just as relevant in the humanities and other areas.

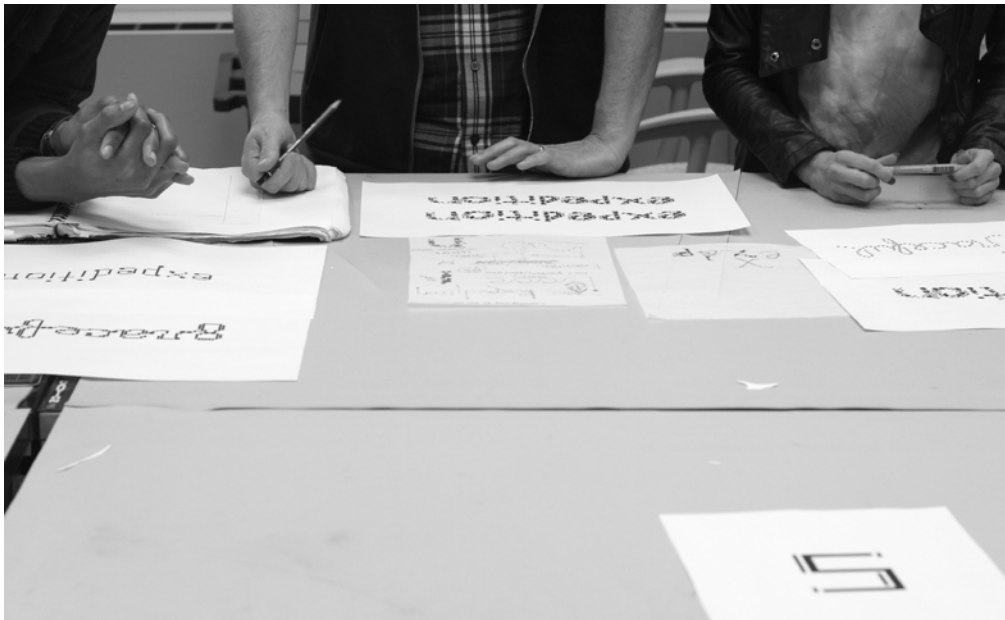
Having so many degrees of freedom in a learning environment may seem daunting. However, an unstaged space does not need to remain completely ambiguous—aspects can be temporarily fixed to support student exploration of new and more complex modes of thinking and discovery, as you see in the photographs of students interacting with each other and with work in progress. The difference is the intentionality: unstaged spaces may prompt instructors to make conscious decisions about configuration and technologies. They also allow for the possibility that some of those choices involve the current students. Such classrooms embody the complex interplay we have been exploring, almost requiring that the people involved in teaching and learning consider themselves as physical

beings and humans in relationship; that they help shape the space and technology; and that the space and technology in turn activate and support their learning and discovery. Unstaged spaces make it clear that “learning activities are . . . about more than the space; . . . Space is . . . about more than just the learning activities” (Boys 2011, 85). They are also well suited to the gradual untethering of technology through greater wireless access and modularity that we are experiencing in the twenty-first century, and they make room for a future of as-yet-unknown developments in the research on learning. No classroom can make learning happen, but perhaps we can think of radically flexible spaces as important and purposeful parts of the ecosystem of higher education classrooms and technologies.



**4.27-4.28**

*Sequence of two images:  
A faculty member in  
graphic design facilitates  
critique during a  
typography class at a  
doctoral institution.*





**4.29**

*Students work independently during a typography class at a doctoral institution.*



**4.30**  
*Students work independently  
during a design class at a  
doctoral institution.*





**4.31**  
*Students listen to peer  
presentations during a design  
class at a doctoral institution.*

## Questions for Further Reflection

- As you reflect on the spaces in which you teach, consider what you think these spaces communicate or imply about the nature of teaching and learning. To what extent has your teaching aligned with, adapted to, or breached the apparent expectations built into the space?
- Think of a time when your use of technology in teaching seemed particularly effective or conducive to learning for your students. If you were to see photographs of that time, what might you notice about the way the technology was used?
- In what ways do educational development offerings at your institution assume that space dictates activities? In what ways do or could they encourage instructors to hack or breach the apparent expectations built into teaching spaces and technologies?
- Who makes decisions about teaching spaces and technologies at your institution? Are they informed by visual representations of current uses, alongside other data and evidence? How might such visual evidence complement the decision-making process?