

Chapter 24

What *Is* Is Not What *Has* to Be: The Five Spaces Framework as a Lens for (Re)design in Education



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Abstract Design is everywhere. Recognizing how everything in education is designed, including systems and cultures, increases our agency to make changes on those designs. In this chapter, we introduce the five spaces framework which provides an analytical tool for understanding the relationships among designed entities, shifting perspectives and offering new possibilities for (re)design. To illustrate the framework, we analyze three technologies in education: the teacher’s desk, PISA test, and learning management systems.

Keywords Design · Systems thinking · Educational systems

Lenses – both physical lenses, which might amplify or color our vision, and metaphorical lenses, shaped by our beliefs and perspectives – alter how we see and interact with the world. The lens we use reveals some aspects of a situation and hides others, “suggest[ing] a different set of practices and solutions” (Ancona et al., 2001, p. 645). In this chapter, we describe how a lens that highlights the artificial nature of education can enable innovative approaches to redesigning education.

The lens we apply here reveals that most everything around us is made up: created, whether intentionally or unintentionally, by other humans. This includes things that we often take to be natural, such as the foods we eat or animals we keep as pets. As it turns out, most of the vegetables we eat and the pets we love to spend time with

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have been “designed” by artificial selection over years, decades, and even centuries. From this perspective, an apple (or an Aussie Doodle, for that matter) is “designed” as much as a pencil or a college application. To be clear, this does not mean that there are no natural kinds, such as oceans, trees, or galaxies, out there in the world. But increasingly, we humans have managed to insulate ourselves from the natural worlds and often are engaging almost entirely with the world of the artificial.

Recognizing that we live, for the most part, in an artificial, human-created world can change how we *are* in the world, how we perceive it, interact with it, and, more importantly, how we can change it. For Herb Simon (1969), this artificial world calls for a “science of the artificial” which is both a recognition of the designed nature of existence as well as a call to create a new form of knowledge, distinct from the natural sciences and the humanities. It points to the fact that there is nothing essential about much of what and how we interact with the artificial world. This provides us with agency to change the world since there is nothing inherently “natural” about these artifacts or processes or systems. One could argue that it also provides us with a moral imperative to do so because we know that much of the world around us is unfair, often disadvantaging and marginalizing huge swaths of people and communities. This is where the sciences of the artificial meet the idea of design. Since design is “concerned not with how things are but with how they might be” (Simon, 1969, p. 111), designers are adept at seeing what could or “might” be; they recognize that what *is* is not what *has to be*.

Included in this artificial world is education. Almost every aspect of what makes up today’s educational system – classes, schools, credit hours, universities, degrees, even the very idea of receiving an “education” – has been invented by humans. The current design of education does not work for many, particularly the groups that have been historically marginalized. If schools are not fun, if they do not support play and creativity, it is because they were designed to be this way. Because these are creations of humans, they can be reimagined and redesigned for better outcomes. Although changing educational system might be incredibly complex, it is worth recognizing that it is designed and so can be re-designed.

In our work, we have found that expanding what we see as artificial, particularly the artificial nature of education and schooling, can enable powerful change. It is enabling in two ways. First, it allows us to interrogate everything around us, not taking it as a given, but rather something that was created and thus can be re-created, re-imagined, and re-designed. Second, it provides a response to those who resist change by making an essentialist argument – “this is *just* how things are.” Acknowledging the artificiality of the system suggests that this is how things *may* be, but they don’t *have to* be this way.

Another important aspect of seeing the world as artificial is expanding what we mean by the “world.” For too long we (and the field of design) have conceived of the designed world as constituted of physical artifacts and other technological tools. Although these are important, we argue that there are many intangible aspects to the designed world. They may include processes (such as the process of registering for school), systems (such as the K-20 educational system), or even culture (such as the culture of high-school football). Although design in some spheres (such as systems

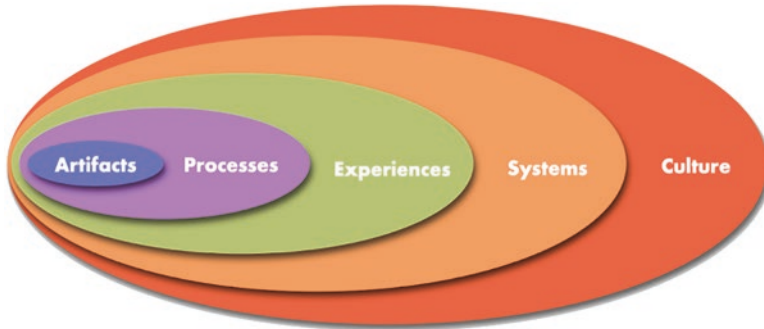


Fig. 24.1 One representation of the five spaces for design in education

and culture) might be more complex than others, applying a wide-angled design lens can increase agency, empowering change makers. In order to do so, we need a frame, a way of categorizing or classifying the different kinds of “designed things” that are out there in the world.

We have created a framework that supports applying this type of design lens to education. The *Five Spaces for Design in Education* framework presents design as occurring across five interactive spaces: artifacts, processes, experiences, systems, and culture (see Fig. 24.1 and Table 24.1). The framework provides an analytical tool for understanding the relationships among designed entities, shifting perspectives, and offering new possibilities for (re)design.

In this chapter, we will use the five spaces framework to analyze three technologies in education: the teacher’s desk, PISA test, and learning management systems (LMS).

Case 1: The Teacher’s Desk

We start by considering something that seems like a given in education – the physical elements of a classroom, specifically the teacher’s desk (an artifact).¹ We illustrate how physical ‘designed’ elements of schooling like the desk intertwine with and reflect the processes, experiences, systems, and cultures of schooling. We do this to make visible the relationships among designed entities, offering new possibilities for thinking about (re)design.

As an *artifact*, a teacher’s desk is a flat workspace that can hold papers, a computer, writing utensils, etc. It often also stores things, presumably the things that teachers need to do their work. These desks usually support a work space for a

¹Our thinking about the role of the teacher desk in educational processes, experiences, and systems originated from a blog post written by Shawn Loescher which can be found here: <https://sloescher.com/onleskine/f/on-desks>

Table 24.1 Descriptions of the five spaces for design in education

Space	Definition	Examples
Artifacts	Stable objects that can be perceived through the senses	Curricular materials, tools, software, manipulatives, videos
Processes	A procedure or directions that can be used outside of the context within which it was created to achieve a goal	Lesson plans, curricula, schedules
Experiences	A piece of time with associated sights, sounds, feelings, and thoughts	Activities, celebrations (graduation), learning communities
Systems	An organized and purposeful structure of interrelated and interdependent elements	Registration, certification system, degree program, evaluation systems
Culture	A pattern of shared basic assumptions that allows groups to perceive and interpret the world in similar ways, develop and communicate meaning, and transmit values to new group members	Perceptions of technology, schools, or education broadly; classroom culture; school culture

single person, with a leg barrier on one side that partitions off the individual workspace. The design suggests that a teacher's main job at the desk is to independently work with papers, books, office supplies, and – more recently – computers.

The placement of the desk in the room affects the potential processes and experiences of the classroom. For example, the teacher's desk supports certain *processes*: gathering papers, grading, reviewing curricular materials, and planning lessons. Papers are often stacked on the desk, evaluated, and recorded in a gradebook before being returned to students. A desk in the back of a classroom, with the user facing the room, might be used by a teacher working while monitoring a class, whereas a desk at the front of the room suggests more direct observation. It is also informative to consider the processes desks do *not* support: the physical design of some desks makes it difficult for collaborative work between teacher and student, affecting the experiences (the next space we consider) students and teachers have around desks.

The *experiences* a desk affords are impacted by the physical design, placement, and processes they are used to support. For example, a teacher's desk in the back of a room facing a wall might suggest a space for a teacher to engage in activities separate from the classroom, perhaps mostly used during periods of time when students are not present. A desk in the back facing the main classroom might be a side area to work while still being a part of classroom activity. Or, if the items on the desk are less personal and the space is made available for others to use, a desk might suggest shared ownership of classroom roles, with all participants operating as teachers and learners. For example, Getzels (1974) connects desk position to conceptualizations of students as learners. He stated that when a desk was moved from the front of a classroom, "The vision of the learner as an empty organism was transformed into a vision of the learner as an active organism" (p. 532; see also Woolner et al., 2012). A desk at the front of a room is often a sign of authority, that the teacher is in front and in charge, and the work they do is what directs the learning.

If we move to a *systems* level, we see that the processes enabled by desks – collecting artifacts of “learning” such as homework and tests and evaluating them – works with the larger system of schooling. This system is based on creating evidence of learning that can be objectively evaluated, the results stored in units such as credit hours and degrees. As credit hours or degrees, these pieces of learning can be purchased through tuition. They represent approval or permission for acting in certain roles in society, such as certain professions.

The *cultural* space that relates to the desk can be seen in the use of the desk image of a sixth-grade math teacher’s drawings. David (pseudonym) drew two pictures of desks in response to the question “What does it mean to be a teacher?” (see Fig. 24.2). These pictures were drawn as part of a study on teacher identity and design (Warr, 2021).

David explained that the top image is a teacher working at night on a weekend. The teacher has a “gap in the lesson plans” because “the state added a new standard and dropped one,” and he is trying to find material to address the new standard so that he can go to bed. David connected this event – and the desk it is centered

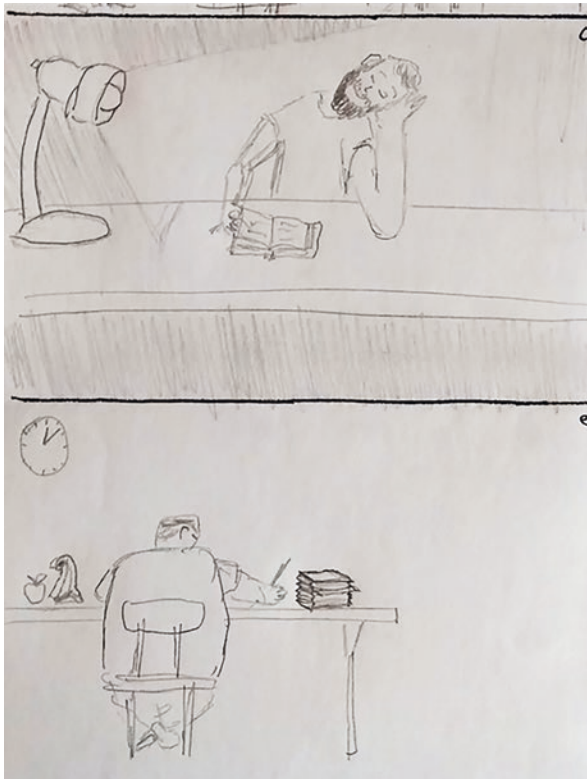


Fig. 24.2 “What it means to be a teacher” created by a sixth-grade math teacher. The artist described the top image as what a teacher might do during a weekend night. The bottom image takes place during lunch on a school day

on – directly to the systems and culture surrounding teachers in the United States. He explained, “It’s a narrative on the societal expectation of teachers to work outside of their work hours. They don’t get weekend nights to themselves.” In other words, because of the structure of the teaching system – with shifting expectations (standards), and limited contracted time for planning or designing – the individual work of a teacher might be relegated to unpaid hours. This practice is generally accepted as part of the culture of teaching and schooling.

In the bottom picture, David again connected work at a desk with the experiences, systems, and culture of teachers. He explained the teacher is being “[taken] advantage of... He’s on his short lunch break. He can’t afford to eat out, he’s got a brown paper bag there and he’s also grading papers... It’s just like a commentary, not on the classroom side but on the contract side of the teaching.” What is happening at the desk – the brown bag lunch eating and grading – is a result of teacher contracts (systems) and expectations (culture).

Case 2: The PISA Test

The PISA test, short for Program for International Student Assessment, like the teacher’s desk, is also an *artifact*. However, we lay it out as a second example precisely because the artifact (i.e., the computer-based test) is deeply and conspicuously intertwined with wider systems and cultures of testing, merit, and knowledge. In fact, in some ways the PISA test, which seeks to compare students across countries in math, science, and reading, can be an exemplar for how an artifact reflects a wider culture and systems.

Culturally, the PISA test reflects and reproduces a certain meritocratic social paradigm that emphasizes the measurement and standardization of academic success. The design is intentional and shared with other large scale standardized tests like the SAT. As Dixon-Román (2017) stated, “The SAT is an apparatus that continues to enact and reconfigure what is possible and what is excluded from mattering for ability, merit, and college admissions” (p. 119). In the case of the PISA test, the artifact then reflects a culture of decision-making designed to focus economic decisions on international comparisons, 15-year-old students, and math, science, and reading performance.

If we move to a *systems* level, we see that the processes enabled by the PISA test (collecting comparative scores in reading, writing, and math across countries) reflects wider systems of educational decision making. Recall, the teacher’s desk was part of the wider educational system based on creating evidence of learning that can be objectively evaluated.

Ultimately, the PISA test was designed to fit within current global economic systems and current decision-making systems at the government level. The test results, which do not provide individual student scores or any sort of formative feedback, are more like research results. The test developers seek to “accurately describ[e] the proficiencies of nationally representative samples of 15-year-olds in

each country” (OECD, 2018). Hence, while the PISA test seems like an educational artifact, it is in fact designed to drive political decision making. Low PISA scores are often accompanied by cries to “close the gap” and, more importantly, often accompanied by big line items in national budgets (Goldstein, 2019).

The *experience* level reveals an important point about the design of the PISA test, which is that the person experiencing the PISA test can be thought of as the person taking the test or as the person using the test scores. In the case of the person taking the test, the experience, like the experience of most standardized tests, is isolated, quiet, and often stressful. In the case of the person using the test scores, the experience can be thought of as simple and clear because the results come out in comparative numbers per subject.

Just as the *experience* related to the teacher’s desk was constrained by the physical affordances, the *experience* of the PISA test is influenced (or constrained) by the culture and the systems in which the PISA test is embedded. We illustrate this to show the interconnected nature of the five spaces.

There are more critiques, more reflections, and more observations that arise when thinking about the design of the PISA test as an artifact *and* as a part of global socio-economic-political systems. However, the goal of this chapter is to think about how the five spaces framework can make visible the relationships among designed entities, offering new possibilities for thinking about the (re)design of educational testing systems. For one, the framework reveals the complexity of doing any type of (re)design work in education.

Redesigning the PISA test entails redesigning some of the current culture designs pervasive in education such as thinking about students as economic resources instead of learners. It also means reflecting on the complex relationship between interrelated systems. Yet, naming those tensions and areas of negotiation may also set the stage for divergent thinking. Could the PISA test be designed for the good of students instead of for political decision making? Why focus on these subjects and not a more holistic measure of human development? Why quantitative comparisons? Why select “country” as a grain-size, given possible within-country variations? How much is this a function of the rise of the idea of the “nation-state” – itself a complex, and historically contingent idea. These questions and others can surface when thinking about the “design” at multiple levels in abstract areas.

In the next section, we shift from thinking about the PISA test as a designed thing at many levels to thinking about another prevalent educational artifact: Learning Management Systems (LMS).

Case 3: The Learning Management System (LMS)

In our discussion of the design of the teacher’s desk and PISA test, certain characteristics of how much of society views education are evident. In the teacher’s desk, we highlighted how, as designed (across the five spaces for design), the desk becomes a space for collecting and grading evidence of learning. With the PISA

test, we emphasized the practice of standardizing and measuring academic achievement to drive political decisions. Considering these aspects of education as designs emphasizes that what *is* is not what *has to be*. The teacher's desk and the PISA test both reflect and affect educational artifacts, processes, experiences, systems, and culture.

In this section, we will apply the five spaces to an analysis of the Learning Management Systems (or LMS). Such systems are ubiquitous in education today, particularly after the significant move to online/virtual learning that was pushed on all of us during the COVID pandemic.

The LMS developed out of the application of computers to education as described by terms such as computer-based instruction (CBI), computer-assisted learning (CAL), and integrated learning system (ILS) (Watson & Watson, 2007). Whereas these terms refer to educational computer programs, including management and tracking of learning, what distinguishes the LMS is its systemic nature: it brings together not only content and learning processes, but also human resources, registration, tracking, and more (Watson & Watson, 2007). An LMS can automate these systems while at the same time supporting creating and delivering content (Ellis, 2009).

In the *systems* space, then, an LMS integrates with other educational systems. For example, it supports administrative tasks such as course registration, assigning instructors, and awarding course credits (Correia, 2018). It integrates with curricular systems such as content development, assessment, and learning standards (Ellis, 2009). Human resources can use the LMS for assigning and monitoring employee training (Ellis, 2009).

Effective LMS's also integrate with various tools and systems external to the educational institution. For example, they might integrate with other software such as Google Docs and work on a variety of operating systems and in various formats (such as desktop and mobile). These external connections can support a more open and connected learning experience, supporting the development of knowledge networks and social learning (Stone & Zheng, 2014).

The *artifact*, *process*, and *experience* spaces of the LMS work together to support this system integration. For examples, on the artifact level, an LMS needs to have the properties that support the integration across various systems and tools. This artifact facilitates *processes* that need to be accomplished by the various systems, such as registration and assessment. The user *experience* of an LMS is dependent on its ability to fluidly support these processes. An effective LMS can reduce workload and provide smoother course management (Correia, 2018).

The most common features of an LMS both reflect and sustain certain *cultural* views of education and learning. This is most evident in its name itself – learning *management* system, that it is a system for managing learning, not for fostering it, for encouraging it, or playing with it. It is a system that allows us to manage learning, particularly within existing systems of education. It is no surprise, therefore, that the structures of most LMS's are based on existing educational practices: separate courses, and within those courses separate modules that hold content centered on specific topics. Student work is submitted and evaluated by the instructor then is

stored in credit hours. These features match the acquisition metaphor of learning, that learning is about gaining knowledge (Sfard, 1998). The acquisition metaphor is at the center of current educational culture and systems (Sfard, 1998).

Thus, LMS's have certain key characteristics. First, they homogenize the learning experience. The focus on managing learning (defined generically and broadly) means that the nature of the content itself or broader educational goals are not seen as being critical to the design of these systems. Second, LMS systems are quite fundamentally based on the idea of blocks (whether they be called degree programs, courses, or modules). These blocks (at least their underlying architectures) are identical. A course in biochemistry is considered as having the same needs as a course on art or education.

More recent research has emphasized other models of learning, such as the participation metaphor (Sfard, 1998), and concepts such as Communities of Inquiry (Garrison, 2007). Some features of the LMS, such as discussion forums and communication channels, can encourage social and participation-based learning. Additionally, mobile applications can increase contextual learning and connectedness – but at the end of the day these systems are about managing learning in terms of inter-operability, credit transfer, tracking participation, and grading.

Thus, the design of a particular artifact, an LMS, constrains the kinds of educational processes that are “allowed” and therefore the very nature of student experience. These structures and architectures are driven by broader systems within which these tools are designed to be used and a broader educational culture that values consistency and interoperability over creativity and divergence.

As society changes and becomes more networked and open (Kali et al., 2019; Voogt et al., 2013), reflecting on the design of the LMS can help update the educational system to meet the needs of learners in a networked society. For example, although some features of an LMS might support participation-centered learning, these features are generally kept within the boundaries of a single course, in a closed group of students, and only available within a limited time frame. Redesigning the LMS could expand learning possibilities. New features might include cross-course forums, social tagging or bookmarking, and tools for connecting with external experts and for opening the learning environment to those external to the course (Stone & Zheng, 2014). Instead of centering on information storage and activity tracking, an LMS for a networked society could be anchored by relationships and form a hub for learning connections across various contexts. Such a change might require a new name, as less emphasis would be put on *managing* learning and more on *expanding* learning.

Of course, redesigning an LMS in this way is not easy. Because the LMS is integrated into the educational system, attempts to move away from an emphasis on closed courses and activity tracking will be difficult. However, moving in this direction has the possibility of changing not only the LMS but also educational processes, experiences, systems, and culture.

Conclusion

By considering these artifacts through the lens of the five spaces, we can better understand how design can happen in multiple ways and multiple spheres. Understanding design in abstract areas like processes, experiences, systems, and cultures can help us think critically and divergently about what can be designed. This understanding, that almost everything is designed and therefore can be re-designed, is more important as we think about ways to affect our education systems in deep, complex, and sustainable ways.

We present this framework as a first step towards re-envisioning deeply embedded, seemingly invisible, designed spaces in education. We recognize that seeing what could or might be is a critical first step towards change in education. We believe the five spaces framework provides a platform to interrogate everything around us as well as a response to those who resist change by arguing that “this is just how things are.” Moreover, seeing the designed nature of education combined with our knowledge that most educational systems are not equitable spaces provides us with a moral imperative to change it to make it better.

Which is why we’ve started to interrogate the very artifact you are reading now, the conclusion section of a book chapter. The conclusion is itself an artifact that reflects a wider set of cultural norms within an academic system. Yet, at the core, our goal in this section is to summarize the chapter, emphasize key points, and possibly leave the reader with something memorable. We feel like our abstract already accomplished most of this. So, instead of a proper conclusion, let’s end with our abstract, the place where we first started from:

Design is everywhere. Recognizing how everything in education is designed, including systems and cultures, increases our agency to make changes on those designs. In this chapter, we introduce the five spaces framework which provides an analytical tool for understanding the relationships among designed entities, shifting perspectives, and offering new possibilities for (re)design. To illustrate the framework, we analyze three technologies in education: the teacher desk, PISA test, and learning management systems.

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