

Transformative Praxis: A Critical Design Framework for Inclusion in Technology-Rich Learning Spaces

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Abstract: Drawing on transformative, critical, and culturally responsive and sustaining traditions of pedagogy and instructional design, we present a technology-focused framework for decentering normative forces along the lines of race, ethnicity, class, language, religion, ability, sex, and gender in online higher education learning spaces that honors each participant for who they are with respect to their identity markers and their intersectional community memberships to promote inclusion and belonging. These normative forces—which simultaneously crowd out and make hypervisible diverse identities—predispose the ends and processes of teaching and learning and structure the nature of academic disciplines. This is particularly apparent online where engagement is decoupled from traditional anchors of relationships and influenced by difference-blind neoliberal perspectives. In response, we provide a framework for inclusion and belonging along two vectors. The first vector is a critical design process inspired by backward design principles: inquiring, translating, activating, and reflecting. The second is a set of inclusive considerations grounded in culturally relevant and responsive pedagogy and the Universal Design for Learning framework: asset-based frames, authentic multiple modes, and mixed mirrors and windows. This process includes an opportunity to interrogate the role of technology as a mediator of learning and teaching for belonging. We further assert that the instructor also needs to engage in identity work to interrogate their positionality in online environments with respect to not only observable and cultural identity markers but also academic disciplinary identity. To illustrate our framework, we provide reflections on the design and enactment of online and technology-rich activity structures that promote inclusion and belonging.

Keywords: educational justice, intersectionality, identity, instructional design, higher education, belonging, inclusion, educational technology

The Entanglements of Belonging, Inclusion, Identity, and Community

As higher education faces an “enrollment cliff” (Campion, 2020; Harvey, 2021; Robinson & Maitra, 2020), it has become a critical mission for postsecondary institutions to create spaces in which students feel welcomed with supports for them to succeed and as if they are meant to be there (Gachago et al., 2023; Jones & Nangah, 2021)—that they *belong*. The flipside of belonging, *alienation*, is rightly viewed as a state to be avoided, as it can lead a student to withdraw from the learning process and potentially to withdraw from higher education entirely (Jones, 2022; Pusztai et al., 2022).

Belonging as a concept, however, is opaque, contested, and unexpectedly difficult to conclusively define. Belonging is typically framed as an emotional state (Fong Lam et al., 2015; Gillen-O’Neel, 2021; Wood & Waite, 2011) so that feeling as if one belongs feels “good” or “safe.” Deep

and transformational learning can occur, though, when the student encounters a cognitive-social sense of disequilibrium (Bowman, 2010; Che et al., 2009; Gurin et al., 2002), a feeling that feels neither good nor safe. In addition, there are also structural and normative forces that factor into how students engage and interact with each other, the content and learning activities, and the instructor, such as race, ethnicity, class, language, religion, ability, sex, and gender (Harpur et al., 2023; Kolluri & Tichavakunda, 2022; Patel, 2015). These structural forces are not “emotional” in origin, even though the impacts of those forces may result in emotional resonances (Duran, 2021; Fasching-Varner et al., 2014; Kelly et al., 2021). We therefore extend the concept of belonging with the broader and more poignant concept of *inclusion*, which recognizes, acknowledges, and honors extra-emotional states such as justice and equity (Salmi & D’Addio, 2021) and supports encountering barriers with a sense of agency (Moriña, 2017; Núñez, 2014; Suzuki, 2017).

To promote belonging and inclusion, it is necessary to further delve into the normative forces in higher education that effectively define what a “good student” looks like and how a “good student” behaves or succeeds. The normative nature can simultaneously crowd out and make hypervisible diverse identities (Reddy, 1998), predisposing the ends and processes of teaching and learning, and structuring the nature of the academic disciplines (Jantsch, 1972; Strandbrink, 2018). This combination of normativity and predispositionality is antithetical to an authentic sense of belonging and inclusion. The normative phenomenon is particularly apparent in online courses where engagement is decoupled from traditional anchors of relationships (Castells, 2000) and influenced by difference-blind neoliberal perspectives (Baxter et al., 2018; Keehn et al., 2018).

In response, we provide an instructional design framework for inclusion and belonging with technology that accounts for this range of contextual, structural, and intersectional identity and community factors. To ground the framework, we draw on Schwab’s (1973) notion of commonplaces (see Figure 1) to structure and bound the approach. The four commonplaces, or areas of consideration during a design process, are *learners*, the people who are intended to grow and develop through the educational experiences; the *educator*, who works to structure and curate the learning environment (which is situated at the intersection of the commonplaces); the *subject matter*, or the disciplinary knowledge, skills, and practices that are intended to be taught; and the sociocultural *milieus* in which teaching and learning are embedded, including the identities that students represent, the communities in which they are embedded, and the historical and political landscapes that influence activities. The goal is to engage in a dialectic between the four commonplaces, identifying the tensions and congruences in each area to provide an effective learning environment in which students’ identities, communities, and agency are recognized and honored to promote a place primed for belonging and inclusion. We operationalize these concepts through our critical design praxis framework in the following section.

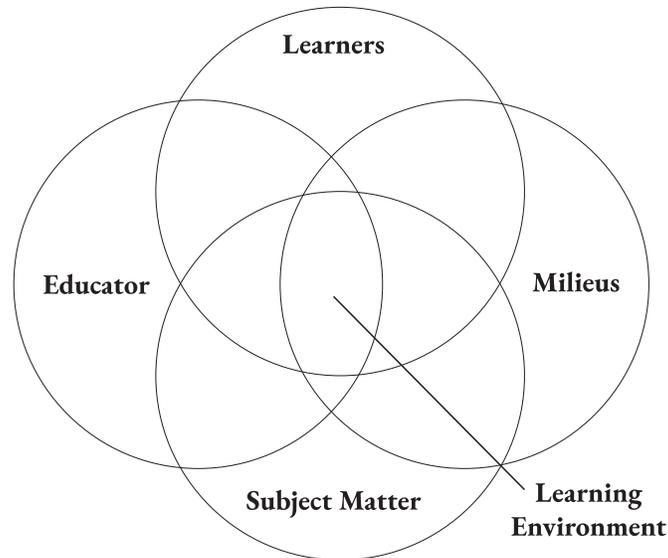


Figure 1. Schwab’s (1973) commonplaces of learning.

A Framework for Critical Design Praxis for Belonging and Inclusion

Our framework for inclusion and belonging is composed of a *critical design process* and, at each stage of the process, *prompts for consideration*. The critical design process is inspired by principles of backward design (Stone Wiske, 1997; Wiggins & McTighe, 2005) and follows a pathway from *inquiring* to *translating* to *activating* to *reflecting*. The prompts for consideration, which are grounded in culturally relevant and responsive pedagogy (Gay, 2018; Ladson-Billings, 1995; Sims Bishop, 1990) and the Universal Design for Learning framework (Cioè-Peña, 2022; Fritzgerald, 2020; Rose & Meyer, 2000), include *assets-based frames*, *authentic multiple modes*, and *mixed mirrors and windows*. The prompts should be considered at each stage of the process, and the process is intended to be cyclical in nature (see Figure 2) to allow a deepened understanding of belonging and inclusion with each journey through the process. We also provide specific questions to support *intentional uses of technology* as a medium through which learning, teaching, belonging, and inclusion can take place. After introducing the framework, we provide two reflective cases from our experiences utilizing the process to plan and teach courses that integrate technology and promote belonging and inclusion.

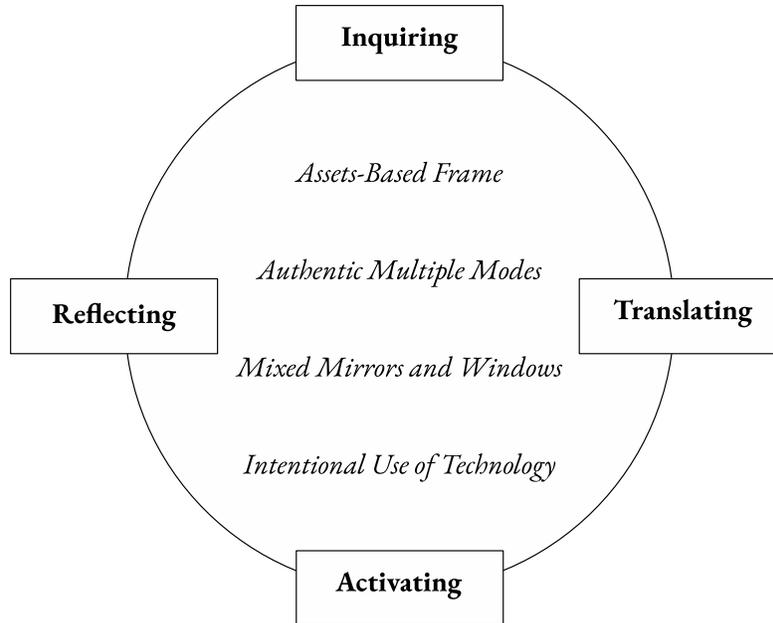


Figure 2. Critical design process cycle with prompts for consideration.

The Critical Design Process: From Inquiring to Reflecting

Drawing on a foundation of backward design (Stone Wiske, 1997; Wiggins & McTighe, 2005), the critical design process starts with “the end in mind,” interrogating one’s syllabus and activities through the ultimate goals of the course. Backward design forces the educator to consider such questions as:

- What should my students know and be able to do by the end of the course?
- What is worth knowing in my course and my field, and why is it important?
- How do the knowledge and practices of my field connect to my students’ experiences and backgrounds?

Rather than taking the activities and assessments of a university-level course—readings, papers, problem sets, exams, discussions, and lectures (the default in-class activity)—for granted, a backward design process allows the educator to intentionally base their selected activities and assessments on the goals. This intentionality not only facilitates deeper understandings and a better command of disciplinary-based practices (Davis & Autin, 2020; Michael & Libarkin, 2016; Mills et al., 2019) but also fosters a greater sense of authenticity and agency, requirements for building belonging and inclusion (Pinner, 2014; Silverstein, 2019; Vaccaro & Newman, 2017).

With this intentionality in place, the critical design process proceeds in a cyclical manner where the final stage—reflecting—is intended to bring the educator back to the first stage—inquiring. The stages are not intended to be lockstep and serial, and some stages can proceed concurrently and in a different order from that presented here. Generally, however, we have found the following pathway to be useful in our own planning and consistent with course design strategies.

Inquiring

Inquiring is the stage in which the course goals, materials, and activities are interrogated and problematized (Green, 2010) in the light of the standard disciplinary knowledge and practices students are expected to learn while considering students' lived experiences, the identities they represent, and the communities from which they emerge (Birbal & Hewitt-Bradshaw, 2019; Hongboontri & Noipinit, 2020). Some of this involves learning who your students are and what their ultimate goals are for themselves and how they might use what they learn in the course, as well as fully understanding the *default theories* (Ladson-Billings, 1995) that are bundled with disciplinary knowledge and practices. Uncovering *essential questions* (Wiggins & McTighe, 2005)—questions that by design do not have one correct answer, allow for multiple entry points, and help students build knowledge and practices—is an important part of the inquiring stage.

Disciplinary default theories are often tacitly understood by academics and educators who have adopted the epistemological and practical knowledge required for success, in essence assimilating into the field, whereas they may be a disorienting and labyrinthine set of hidden rules and expectations for students. By default, many courses are taught to induct students into an academic position in the field (Boud, 1990; Molesworth et al., 2009). Part of inquiring is understanding the signature pedagogies (Shulman, 2005) of one's field to determine how they fit into one's courses and how they connect with one's students' lives, communities, and ultimate goals. It may be that for some courses the signature pedagogies do not figure into the purpose of the course at all, whereas for other courses the signature pedagogies need to be intentionally identified and culturally, experientially, and cognitively connected with students' lived experiences.

The inquiring stage concretely involves exploring the following prompts when planning and designing a course:

- *Understand your students.* Understand who your learners are in both concrete and abstract ways, understanding individual student strengths, needs, and experiences as well as the communities with which they identify.
- *Develop essential questions.* Essential questions allow you to determine the broad areas of focus in the unit, lesson, or experience by determining what will be uncovered during the learning process and what is important to understand and be able to do.
- *Identify and problematize default theories.* The disciplinary knowledge and practices bundled in your course may be there intentionally or by accident and are always oriented toward a particular goal for students whether you realize it or not. Uncovering the default theories, epistemological and practical assumptions, and signature pedagogies of your discipline is essential. It is important to interrogate and problematize these underlying theories to understand what is being favored, what is being left out, and what is being sustained.
- *Highlight challenges and opportunities.* Thinking ahead and mapping out the potential challenges and opportunities of engaging with students on this topic will provide you with an understanding of where scaffolding may need to be provided or what might need to be adapted to facilitate deep learning and transformative activity.

Translating

Translating is the process of transforming goals and questions into actionable experiences through the curation of materials, the development of activities and assessments, and the design of scaffolding.

The starting and end points are identified in the inquiring stage, but the pathways for learning are mapped out in the translating stage.

Just as the ends and goals of one's courses are not neutral, neither are the materials and experiences. The materials, resources, and activities can provide opportunities for growth, authentic belonging, and inclusion, or they can serve to reinforce default theories of what a good student should look like and how they should behave. A reinforcement of default theories would require students to suppress their identities and community memberships and assimilate or conform to a rigid and complex system of epistemologies and practices that are not their own (B. A. Brown, 2004; Halsey et al., 2020). In addition, given the novel nature of discipline-based content and practices, it is essential to anticipate where learners may need support and scaffolding (Bransford et al., 2000; Lee, 2017) to make sense of, understand, and grapple with (rather than assimilate) the ideas and practices that are being shared with them. Translating involves exploring the following prompts:

- *Formulate goals and markers.* Along the pathway of deep and transformational learning, it is important to set guideposts so that you and your students are on a good path. Developing a set of intermediate and long-term goals facilitates this process.
- *Identify resources.* Resources and materials are important for students' learning and exposing them to new ideas and information, as well as offering opportunities to see themselves in the curriculum. Resources can be any type of media (books, websites, videos, podcasts, etc.) or even people, such as content experts or community members, among others.
- *Design activities.* Activities are where learners make sense and meaning by comparing new information and practices against their own knowledge and experiences and prepare plans for future engagement. Following the essential questions and the goals and markers as guides, activities provide concrete pathways toward deeper understandings and transformative practices.
- *Develop scaffolding.* Learners are diverse and require varying levels of scaffolding to ensure equitable engagement with the learning environment. As resources are identified and activities are designed, intentional structures of scaffolding are developed to ensure this equity and growth.

Activating

The activating stage is what most people think of as the actual acts of "teaching," engaging with learners, materials, and activities. Whether online or off, this stage requires real-time adjustment and judgment to ensure that supports and scaffolding that may not have been predicted are put into play as needed. At the core of this stage is the idea that with appropriate planning and facilitation, the learners become agents of their own learning and support each other in the process (Loeng, 2020). This fostering of agency is most effective in a learning environment oriented toward personal and social transformation (Alam, 2022; Pattiwael, 2019). Activating is supported by the exploration of the following prompts:

- *Teach and interact.* Enact the lessons, engage learners in activities, and provide feedback. Whether face-to-face, online, or hybrid, learners have the opportunity to engage in deep and transformational learning.
- *Provide opportunities for peer-led support.* One instructional asset that is often overlooked is peer support. When engaged with intention and guidance, peers can help each other learn, grow, and succeed in ways that educators may not be able to.

- *Provide just-in-time scaffolding.* As additional scaffolding and guidance may be necessary to fully engage in deep and transformational learning, you should bring in additional resources and activities to support learning.

Reflecting

The reflecting stage allows the educator to look back and think forward to the next lesson, unit, or experience or to plan for the next time the lesson, unit, or experience is enacted. The work of Schön (1990) forms the underlying conceptual groundwork for reflective practice. Schön asserted that the basis of reflection is the process of framing and reframing. Reflection in professional practice involves analyzing an event within its context (framing) and viewing it in a new light based on other experiences or plans for future action (reframing; Farrell, 2003). In this context, educators can explore their course and their teaching through the following prompts that mirror the framing and reframing process:

- *Evaluate.* In evaluating the process, you can ask, what deep learning and transformational learning have my students developed? What met my students' needs and what did not? What just-in-time scaffolding did I add, and should that scaffolding be integrated from the beginning next time? What could I have done differently?
- *Modify and adapt.* Based on the ideas surfaced during evaluation, you can make adjustments and modifications for new experiences moving forward, as well as modify and adapt the experience for future enactments.

Deepening the Process with Cultural Relevance, Responsiveness, and Universal Design

The process outlined above provides a general pathway for educators to follow, but it is necessary to deepen the process to provide clear guidelines for belonging and inclusion. With that in mind, we drew upon culturally relevant pedagogy (Ladson-Billings, 1995), culturally responsive pedagogy (Gay, 2018; Silverstein, 2019), and Universal Design for Learning (Cioè-Peña, 2022; Fitzgerald, 2020; Rose & Meyer, 2000, 2002). These foundational frameworks have three principles in common: an acknowledgment and recognition that *all students can learn*, and indeed, this recognition is tied to belonging, inclusion, and justice; a focus on the *learning environment* rather than specific attributes of the student, and how the environment can support or hold back students' learning; and a strong sense of *transformation through learning*, that the classroom, the campus, and the world can become more just places when a broader range of learners are offered an environment where they can succeed and contribute. These frameworks are combined in novel ways below to provide a deepened and more transformative set of prompts for consideration to explore at each stage of the critical design process.

Asset-Based Frames. The idea of an asset-based frame draws on the common principle in all three of the foundational frameworks that each student is capable of learning; if it appears they are not, it is because of some mismatch between the learning environment and the student and their background rather than that the student is unable to learn. This idea helps remind educators to see the assets that students bring with them—a vessel overflowing with cultural wealth and capital (Yosso, 2005)—rather than an individual who lacks or is deficient in disciplinary knowledge and practices (Solorzano & Yosso, 2001). It is further centered in the idea that every person, student, learner, educator, family, and community member is intrinsically valuable. At the postsecondary level, educators often see students only within the context of their courses and forget or discount the value of the milieu in which their students are embedded (Schwab, 1973). This means that education for belonging entails “working with” rather than “working on,” avoiding a “medical model” in which

learners' "deficits" are fixed through interventions (Dampier et al., 2019; Pfothenauer et al., 2019; Triano, 2000). It means treating each learner, representing a set of identities and emerging from and embedded in communities, as a partner and contributor rather than a receiver or trainee. An assets-based frame allows the educator to ask the following questions at each stage of the critical design process:

- Am I viewing students as "deficient" because they do not know ideas and practices I think they should know, or am I viewing my students as knowers and doers of many ideas and practices that can be deepened and extended through teaching and learning with me?
- How do my materials, activities, and assessments enable or hinder students?
- How am I facilitating a learning environment in which students can contribute fully as people with cultural and community repertoires of knowledge and practices that can build on and extend disciplinary epistemologies and skills?

Authentic Multiple Modes

The concept of authentic multiple modes is rooted in the transformative idea that students can impact their classrooms, campuses, and worlds through "authentic" educational activity (Ladson-Billings, 1995, 2016) and the idea that to facilitate deep and successful learning, students need the opportunity to represent what they know and can do through multiple channels (Fritzgerald, 2020; Rose & Meyer, 2002). *Authenticity* involves experiences that challenge students to explore and address real-world issues, tensions, and questions through discipline- and justice-oriented lenses (Herrington et al., 2014; Serrano et al., 2018; Stein et al., 2004). *Multiple modes* refers to the practice of providing students with a range of options in terms of how they make sense of or express what they know and are able to do—including traditional papers and exams, presentations, videos, music, and other forms of expression. By providing a range of different options—which digital technology is primed for (Rose & Meyer, 2002)—in authentic learning environments, students will be able to learn and express their understandings in ways that are not possible through tests, papers, and problem sets alone. Considering authentic multiple modes, therefore, prompts the educator to ask the following questions:

- How do the activities and assessments in my course allow students to demonstrate and reflect on what they have learned and can do in a range of ways and media?
- How does my course provide opportunities for students to engage within relevant, authentic, and meaningful contexts for learning and growing, not just in the discipline, but also in society?

Mixed Mirrors and Windows

The mixed mirrors and windows prompt is grounded in providing materials, resources, and experiences that allow a broad range of identities and communities to see themselves mirrored back and to understand the perspectives of others through a range of media and channels. It is based in the foundational idea that *providing mirrors* allows students and communities to see themselves in the curriculum and that *offering windows* allows students and communities to understand and cultivate a respect for the experiences and perspectives of others (Sims Bishop, 1990). The idea of *mixed* mirrors and windows indicates the insights gained from the Universal Design for Learning framework, that students' engagement and interaction with content can be facilitated through videos, music, and other means of expression, not just through texts. Offering mixed mirrors and windows is a necessary part

of facilitating a thriving and sustainable, diverse, pluralistic, and democratic society because without the ability to see oneself and the opportunity to learn about others, one loses sight of people's wholeness as a society (Nussbaum, 1998). Considering mixed mirrors and windows allows the educator to ask the following questions:

- How does my course provide multiple ways for students to access and interact with content?
- Who is represented in my course? Can all my students see people like them and learn from people not like them from my course?
- What cultural repertoires are highlighted and explored through the course? Does the course represent a full opportunity to connect with diverse cultural repertoires that can connect with my discipline and course content?

Intentionally Utilizing Technology as a Medium for Teaching, Learning, and Belonging

Technology can serve as a medium on which growth and learning take place (Hlynka & Nelson, 1985; Santamaría Graff et al., 2022; Stephens, 2014). Much like the agar medium covering the base of a petri dish, technology provides a surface on which learners and instructors can interact, engage, exchange, grow, and learn. We recognize, however, that technology is not neutral (Benjamin, 2019; Nardi & O'Day, 1999). As Postman (1998) has outlined, technological innovations never benefit all members of society equally, leading to inevitable trade-offs, and the design and construction of technology cannot help but convey at least one “powerful idea.” In educational settings, the powerful ideas conveyed by technologies are typically steeped in assumptions of neoliberalism (Shutkin, 2005) and techno-utopianism (Castañeda & Williamson, 2021), uncritical approaches that reinforce an instrumental approach to learning and teaching (Delanty & Harris, 2021). When technology is not intentionally selected and utilized, technology tools will reinforce, sustain, and expand exclusionary structures such as racism (Benjamin, 2019; Noble, 2018; Tettegah, 2016), economic inequalities (Postman, 1998), and ableism (Hehir, 2007; Wolbring, 2012).

With intentionality and planning, technology can be oriented toward belonging, inclusion, and justice. The following questions provide guidance for selecting and utilizing technology to support design and teaching for belonging and inclusion:

- What trade-offs am I negotiating by using a specific technology tool? What will my students be gaining, and what barriers will the technology present?
- What “powerful ideas” are carried by utilizing a specific technology tool? Is it that learning is a game that should be done for points? That learning occurs in full view of peers and instructors? Are these the “powerful ideas” that I want my students to engage with through my course?
- Are there ways that the technology tacitly or explicitly reinforces racial, cultural, linguistic, economic, or ableist hierarchies, and if so, how can I resist that as a course to promote belonging and inclusion?

Reflecting on Teaching Experiences

This section provides an overview of two activity structures that are grounded in and emerge from the critical design framework. The first example is a way to read and interrogate texts with technology in a way that builds belonging and inclusion. The second example is a way to provide a media-rich and authentic final project.

Social Interrogation of Texts with Technology

An example of the critical design framework being used is in a fully online course delivered in the Canvas learning management system as part of a certificate program for high school teachers to teach college-level courses. Collaborating across university instructors and instructional designers, we considered who the learners were in the inquiring phase: The students enrolled in this certificate program were practicing teachers and we determined that it would be valuable to draw on their assets and experiences as teachers to design the learning activities for the course. Through the process of translating these understandings into goals and learning activities, we ensured there were opportunities for the students to engage with and learn from each other and their experiences in the classroom setting. Additionally, we wanted to provide authentic multiple modes with a variety of ways for learners to engage with content and show their learning. Moving through the phases of the critical design framework, we designed and developed several inclusive learning activities.

One learning activity in this course was a 2-week reading jigsaw. The reading jigsaw learning activity draws on the assets of learners, engages students in mixed mirrors and windows, and provides authentic multiple modes for the learners to explore. To provide scaffolding for students, we anticipated the specific steps the students would take to complete the reading jigsaw. We started by dividing the students into two groups. Each group was assigned a different reading and provided with guiding questions to help them identify important takeaways from the reading. Each student needed to read their assigned reading and together they became an expert group on that reading. Next, each student was prompted to download a copy of a reading matrix and answer guiding questions based on the reading. After that, each expert group would contribute to a single reading matrix and collaborate asynchronously to identify the key takeaways from the reading. Once the expert groups completed their shared reading matrix, the next step was for each student to create a VoiceThread presentation to demonstrate how they could teach the readings to their class. We then paired each student with a classmate from the other expert group to watch each other's VoiceThread presentations. Finally, they completed the other half of the matrix using what they learned from watching the VoiceThread presentation.

The reading jigsaw is just one example of a learning activity in a course where the critical design framework was used. Considering the vector of backward design along with the vector of asset-based frames, authentic multiple modes, and mixed mirrors and windows, we were able to use technology to build belonging and inclusion in this course.

A Media-Rich Authentic Final Project for Engineering Students

In developing a course for future engineers, the final project and its support activities were designed to represent mixed mirrors and windows and asset-based frames. The course was designed to introduce participants to the field of engineering and to help them develop their identities as engineers and technologists. Using backward design, the instructor determined that the final product of the course should be a project in which the participants would collaborate with others to investigate an issue within engineering and technology and co-construct solutions to address these problems.

To prepare for this work, the instructor engaged in inquiring to learn who the students were, the values they hold, how they learn and process information, and what strategies the participants employed to collaborate and complete tasks. To accomplish this, the instructor assigned the 16 Personalities online test to the participants as an activity. The 16 Personalities platform builds on the Myers–Briggs Type Indicator and provides engaging avatars, in-depth analysis about the interaction between types, and descriptions of personality work styles. After the participants completed the assessment, the instructor was able to intentionally group them by the outcomes and ask them to

compare information on their different types, discuss how their types work together, and analyze the different strengths that each person can bring to the group when working together. This activity emphasized the various assets of each group member, allowed them to see themselves in different ways, but also presented the experiences, approaches, and perspectives of other people around them. The instructor used these mirrors and windows to continue curating online videos and other resources that helped the groups effectively complete their final project.

During the translating stage, resources and materials were identified for the participants to provide a better understanding of core course concepts. As an example, a video about the Pegasus security technology was identified and included in the course to present issues pertaining to cybersecurity. Using this video in combination with Kaltura (<https://corp.kaltura.com/>), an online video quiz was created: Each group defined what ethics meant to them, identified the stakeholders surrounding the technology, identified how their own backgrounds in engineering could contribute to cybersecurity technology, and described how their expertise could contribute to addressing the issues raised in using the Pegasus technology. This quiz allowed the instructor to directly translate some of the course concepts, such as engineering ethics, data security, and community impact, into personal and relevant experiences for each of the participants. In addition, this activity served as intentional scaffolding developed by the instructor to ease students into the concepts that they would have to apply in their final projects. Such scaffolding is an important feature of translating.

After activating the knowledge developed through the 16 Personalities assessment, the Kaltura activity, and other learning experiences in the class, the instructor presented the participants with a final project that allowed each group to select an issue in engineering and technology that was important to them and to develop a webpage using Microsoft Sway that would explain the problem, describe the individuals impacted, discuss the ethical considerations surrounding the problem and solution, and then elaborate on the solution that the group designed. To present this final project, the instructor taught a hands-on three-lesson series that focused on how to use Microsoft Sway, how to conduct research on issues within engineering and technology, and how to synthesize group members' ideas with existing data. As a part of this process, each member had to develop individual reflections on how they would contribute to the group's work and submit it within the 1st week of project planning. These lessons and activities allowed the instructor to further activate students' knowledge by providing engaging instruction and giving students the opportunity to leverage their own agency to pursue their own interests in engineering and technology.

At the conclusion of the project, the instructor reviewed each Microsoft Sway site and personally reflected on how well they had conveyed the course concepts by assessing the extent to which participants demonstrated an understanding of the materials. The instructor considered other tools and methods to address the course concepts based on the groups' Sway sites. Also, the instructor determined what to revise for the next course to best meet the participants' needs and leverage the strengths that they bring to engineering. Adapting and adjusting the course curriculum for future classes is a key element in the reflecting phase. In reflecting, the instructor was able to consider the experience as a whole and to make changes that would lead to being more responsive to the needs of each student.

Conclusions and Final Reflections

In this article, we have identified the need to engage in a process of critical instructional design with technology to promote belonging and inclusion in higher education, presented a framework that provides a pathway to do so, and provided models for what this looks like. Thus far, we have been focused—rightly so—on students and their interactions with the coursework and each other. For the process to be truly *transformative*, however, there needs to be work, growth, and change on the part of the instructor as well (Castelli, 2011; McCune, 2021; Ouyang et al., 2020). A design process or learning

experience is not transformative if the instructor is also changed by the process; the instructor, after all, is represented by one of the commonplaces (Schwab, 1973).

Although the processes of inquiring, translating, activating, and reflecting through assets-based frames, authentic multiple modes, and mixed mirrors and windows are indeed work, it is also necessary for the instructor to pay attention to themselves and their learning, their growth, the biases and assumptions they bring, and how they change as a result of interacting with students. We assert that the instructor needs to engage in identity work (Bataille & Vough, 2022; A. D. Brown, 2022; Watson, 2008) as part of this critical and transformational process, to interrogate their positionality in learning environments with respect to not only observable and cultural identity markers (Crowley & King, 2018; Price-Dennis et al., 2021; Schwartz, 2020; Sealy-Ruiz, 2023) but also their academic disciplinary identity (Haynes, 2023; Henkel, 2005; Hyland, 2002). This process of self-interrogation will lead to learning environments that are rooted in belonging and inclusion and contribute to a more just and equitable society and world.

References

- Alam, A. (2022). Mapping a sustainable future through conceptualization of transformative learning framework, education for sustainable development, critical reflection, and responsible citizenship: An exploration of pedagogies for twenty-first century learning. *ECS Transactions*, 107(1), Article 9827. <https://doi.org/10.1149/10701.9827ecst>
- Bataille, C. D., & Vough, H. C. (2022). More than the sum of my parts: An intrapersonal network approach to identity work in response to identity opportunities and threats. *Academy of Management Review*, 47(1), 93–115. <https://doi.org/10.5465/amr.2018.0026>
- Baxter, J., Callaghan, G., & McAvoy, J. (2018). The context of online teaching and learning: neoliberalism, marketization and online teaching. In J. Baxter, G. Callaghan, & J. McAvoy (Eds.), *Creativity and critique in online learning* (pp. 13–29). Palgrave Macmillan. https://doi.org/10.1007/978-3-319-78298-0_2
- Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim Code*. Polity.
- Birbal, R., & Hewitt-Bradshaw, I. (2019). Integrating student voices to promote inclusive curricular practices in post-colonial education systems in the Anglophone Caribbean. In S. N. J. Blackman, D. A. Conrad, & L. I. Brown (Eds.), *Achieving inclusive education in the Caribbean and beyond: From philosophy to praxis* (pp. 205–225). Springer International Publishing. https://doi.org/10.1007/978-3-030-15769-2_12
- Boud, D. (1990). Assessment and the promotion of academic values. *Studies in Higher Education*, 15(1), 101–111. <https://doi.org/10.1080/03075079012331377621>
- Bowman, N. A. (2010). Disequilibrium and resolution: The nonlinear effects of diversity courses on well-being and orientations toward diversity. *The Review of Higher Education*, 33(4), 543–568. <https://doi.org/10.1353/rhe.0.0172>
- Bransford, J., Brown, A., & Cocking, R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. National Academy Press.
- Brown, A. D. (2022). Identities in and around organizations: Towards an identity work perspective. *Human Relations*, 75(7), 1205–1237. <https://doi.org/10.1177/0018726721993910>
- Brown, B. A. (2004). Discursive identity: Assimilation into the culture of science and its implications for minority students. *Journal of Research in Science Teaching*, 41(8), 810–834. <https://doi.org/10.1002/tea.20228>
- Campion, L. L. (2020). Leading through the enrollment cliff of 2026 (Part I). *TechTrends*, 64(3), 542–544. <https://doi.org/10.1007/s11528-020-00492-6>

- Castañeda, L., & Williamson, B. (2021). Assembling new toolboxes of methods and theories for innovative critical research on educational technology. *Journal of New Approaches in Educational Research*, 10(1), 1–14. <https://doi.org/10.7821/naer.2021.1.703>
- Castelli, P. (2011). An integrated model for practicing reflective learning. *Academy of Educational Leadership Journal*, 15, 15-30.
- Castells, M. (2000). *The rise of the network society*. Blackwell.
- Che, M., Spearman, M., & Manizade, A. (2009). Constructive disequilibrium. In R. Lewin (Ed.), *The handbook of practice and research in study abroad: Higher education and the quest for global citizenship* (pp. 99–116). Routledge.
- Cioè-Peña, M. (2022). TrUDL, a path to full inclusion: The intersectional possibilities of translanguaging and Universal Design for Learning. *TESOL Quarterly*, 56(2), 799–812. <https://doi.org/10.1002/tesq.3074>
- Crowley, R. M., & King, L. J. (2018). Making inquiry critical: Examining power and inequity in the classroom. *Social Education*, 82(1), 14–17.
- Dampier, G., Baker, L. A., Spencely, C., Edwards, N. J., White, E., & Taylor, A. M. (2019). Avoiding the deficit model and defining student success: Perspectives from a new foundation year context. *Journal of the Foundation Year Network*, 2, 41–52.
- Davis, T. C., & Autin, N. P. (2020). The cognitive trio: Backward design, formative assessment, and differentiated instruction. *Research Issues in Contemporary Education*, 5(2), 55–70.
- Delanty, G., & Harris, N. (2021). Critical theory and the question of technology: The Frankfurt School revisited. *Thesis Eleven*, 166(1), 88–108. <https://doi.org/10.1177/07255136211002055>
- Duran, A. (2021). “Outsiders in a niche group”: Using intersectionality to examine resilience for queer students of color. *Journal of Diversity in Higher Education*, 14(2), 217–227. <https://doi.org/10.1037/dhe0000144>
- Farrell, T. (2003). *Reflective practice in action*. Corwin.
- Fasching-Varner, K. J., Albert, K. A., Mitchell, R. W., & Allen, C. (2014). *Racial battle fatigue in higher education: Exposing the myth of post-racial America*. Rowman & Littlefield.
- Fong Lam, U., Chen, W.-W., Zhang, J., & Liang, T. (2015). It feels good to learn where I belong: School belonging, academic emotions, and academic achievement in adolescents. *School Psychology International*, 36(4), 393–409. <https://doi.org/10.1177/0143034315589649>
- Fritsgerald, A. (2020). *Antiracism and Universal Design for Learning*. CAST.
- Gachago, D., Huang, C.-W., Czerniewicz, L., & Deacon, A. (2023). A commodity to be exploited and exhausted: Expressions of alienation in higher education. *Digital Culture & Education*, 14(4), 36–52. <https://www.digitalcultureandeducation.com/volume-14-4>
- Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice*. Teachers College Press.
- Gillen-O’Neel, C. (2021). Sense of belonging and student engagement: A daily study of first-and continuing-generation college students. *Research in Higher Education*, 62(1), 45–71. <https://doi.org/10.1007/s11162-019-09570-y>
- Green, B. (2010). Rethinking the representation problem in curriculum inquiry. *Journal of Curriculum Studies*, 42(4), 451–469. <https://doi.org/10.1080/00220270903494998>
- Gurin, P., Dey, E., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard Educational Review*, 72(3), 330–367. <https://doi.org/10.17763/haer.72.3.01151786u134n051>
- Halsey, S. J., Strickland, L. R., Scott-Richardson, M., Perrin-Stowe, T., & Massenburg, L. (2020). Elevate, don’t assimilate, to revolutionize the experience of scientists who are Black, Indigenous and people of colour. *Nature Ecology & Evolution*, 4(10), Article 10. <https://doi.org/10.1038/s41559-020-01297-9>

- Harpur, P., Szucs, B., & Willox, D. (2023). Strategic and policy responses to intersectionality in higher education. *Journal of Higher Education Policy and Management*, 45(1), 19–35. <https://doi.org/10.1080/1360080X.2022.2144790>
- Harvey, B. C. (2021). Teetering on the demographic cliff, Part 1: Prepare now for the challenging times ahead. *Planning for Higher Education*, 49(4), 1–13.
- Haynes, K. (2023). Reflexivity and academic identity in accounting: Intersubjective reflexive identity work as a feminist academic. *Accounting, Auditing & Accountability Journal*, 36(5), 1379–1395. <https://doi.org/10.1108/AAAJ-10-2022-6099>
- Hehir, T. (2007). Confronting ableism. *Educational Leadership*, 64(5), 8–14.
- Henkel, M. (2005). Academic identity and autonomy in a changing policy environment. *Higher Education*, 49(1), 155–176. <https://doi.org/10.1007/s10734-004-2919-1>
- Herrington, J., Reeves, T. C., & Oliver, R. (2014). *Authentic learning environments*. Springer.
- Hlynka, D., & Nelson, B. (1985). Educational technology as metaphor. *PLET: Programmed Learning & Educational Technology*, 22(1), 7–15. <https://doi.org/10.1080/1355800850220102>
- Hongboontri, C., & Noipinit, N. (2020). Practical curriculum inquiry: Students' voices of their EFL curriculum and instruction. *Australian Journal of Teacher Education (Online)*, 39(11), 65–81. <https://doi.org/10.3316/informit.787718676080609>
- Hyland, K. (2002). Authority and invisibility: Authorial identity in academic writing. *Journal of Pragmatics*, 34(8), 1091–1112. [https://doi.org/10.1016/S0378-2166\(02\)00035-8](https://doi.org/10.1016/S0378-2166(02)00035-8)
- Jantsch, E. (1972). Inter- and transdisciplinary university: A systems approach to education and innovation. *Higher Education*, 1(1), 7–37. <https://doi.org/10.1007/BF01956879>
- Jones, C. S. (2022). Education and the social mobility conundrum: An examination of the 'psychosocial and academic trust alienation theory' in the context of disadvantaged students in the UK secondary education sector. *Children & Society*. Advance online publication. <https://doi.org/10.1111/chso.12677>
- Jones, C. S., & Nangah, Z. (2021). Higher education students: Barriers to engagement; psychological alienation theory, trauma and trust: A systematic review. *Perspectives: Policy and Practice in Higher Education*, 25(2), 62–71. <https://doi.org/10.1080/13603108.2020.1792572>
- Keehn, G., Anderson, M., & Boyles, D. (2018). Neoliberalism, technology, and the university: Max Weber's concept of rationalization as a critique of online classes in higher education. In A. Stoller & E. Kramer (Eds.), *Contemporary philosophical proposals for the university* (pp. 47–66). Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-72128-6>
- Kelly, B. T., Gardner, P. J., Stone, J., Hixson, A., & Dissassa, D.-T. (2021). Hidden in plain sight: Uncovering the emotional labor of Black women students at historically White colleges and universities. *Journal of Diversity in Higher Education*, 14(2), 203–216. <https://doi.org/10.1037/dhe0000161>
- Kolluri, S., & Tichavakunda, A. A. (2022). The counter-deficit lens in educational research: Interrogating conceptions of structural oppression. *Review of Educational Research*, 93(5), 641–678. <https://doi.org/10.3102/00346543221125225>
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465–491. <https://doi.org/10.3102/00028312032003465>
- Ladson-Billings, G. (2016). And then there is this thing called the curriculum: Organization, imagination, and mind. *Educational Researcher*, 45(2), 100–104. <https://doi.org/10.3102/0013189X16639042>
- Lee, C. D. (2017). Expanding visions of how people learn: The centrality of identity repertoires. *Journal of the Learning Sciences*, 26(3), 517–524. <https://doi.org/10.1080/10508406.2017.1336022>

- Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*, 2020, Article e3816132. <https://doi.org/10.1155/2020/3816132>
- McCune, V. (2021). Academic identities in contemporary higher education: Sustaining identities that value teaching. *Teaching in Higher Education*, 26(1), 20–35. <https://doi.org/10.1080/13562517.2019.1632826>
- Michael, N. A., & Libarkin, J. C. (2016). Understanding by design: Mentored implementation of backward design methodology at the university level. *Bioscene: Journal of College Biology Teaching*, 42(2), 44–52.
- Mills, J., Wiley, C., & Williams, J. (2019). “This is what learning looks like!”: Backward design and the framework in first year writing. *Portal: Libraries and the Academy*, 19(1), 155–175. <https://doi.org/10.1353/pla.2019.0008>
- Molesworth, M., Nixon, E., & Scullion, R. (2009). Having, being and higher education: The marketisation of the university and the transformation of the student into consumer. *Teaching in Higher Education*, 14(3), 277–287. <https://doi.org/10.1080/13562510902898841>
- Moriña, A. (2017). Inclusive education in higher education: Challenges and opportunities. *European Journal of Special Needs Education*, 32(1), 3–17. <https://doi.org/10.1080/08856257.2016.1254964>
- Nardi, B. A., & O’Day, V. L. (1999). *Information ecologies: Using technology with heart*. MIT Press.
- Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism* (Illustrated edition). NYU Press.
- Núñez, A.-M. (2014). Advancing an intersectionality framework in higher education: Power and Latino postsecondary opportunity. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research* (Vol. 29, pp. 33–92). Springer Netherlands. https://doi.org/10.1007/978-94-017-8005-6_2
- Nussbaum, M. C. (1998). *Cultivating humanity*. Harvard University Press.
- Ouyang, F., Chang, Y.-H., Scharber, C., Jiao, P., & Huang, T. (2020). Examining the instructor-student collaborative partnership in an online learning community course. *Instructional Science*, 48(2), 183–204. <https://doi.org/10.1007/s11251-020-09507-4>
- Patel, L. (2015). Desiring diversity and backlash: White property rights in higher education. *The Urban Review*, 47(4), 657–675. <https://doi.org/10.1007/s11256-015-0328-7>
- Pattiwael, A. S. (2019). Literature for developing student’s humanity awareness. *Journal International Seminar on Languages, Literature, Arts, and Education (ISLLAE)*, 1(1), Article 1. <https://doi.org/10.21009/ISLLAE.01115>
- Pfotenhauer, S. M., Juhl, J., & Aarden, E. (2019). Challenging the “deficit model” of innovation: Framing policy issues under the innovation imperative. *Research Policy*, 48(4), 895–904. <https://doi.org/10.1016/j.respol.2018.10.015>
- Pinner, R. (2014). The authenticity continuum: Towards a definition incorporating international voices: Why authenticity should be represented as a continuum in the EFL classroom. *English Today*, 30(4), 22–27. <https://doi.org/10.1017/S0266078414000364>
- Postman, N. (1998). *Five things we need to know about technological change*. <https://www.cs.ucdavis.edu/~rogaway/classes/188/materials/postman.pdf>
- Price-Dennis, D., Sealey-Ruiz, Y., Rogers, R., & Mahiri, J. (2021). *Advancing racial literacies in teacher education: Activism for equity in digital spaces*. Teachers College Press.
- Pusztai, G., Fényes, H., & Kovács, K. (2022). Factors influencing the chance of dropout or being at risk of dropout in higher education. *Education Sciences*, 12(11), Article 804. <https://doi.org/10.3390/educsci12110804>
- Reddy, M. T. (1998). Invisibility/hypervisibility: The paradox of normative Whiteness. *Transformations: The Journal of Inclusive Scholarship and Pedagogy*, 9(2), 55–64.

- Robinson, J., & Maitra, D. S. (2020 May 17). *Higher education after COVID-19 - Policy brief*. SSRN. <http://dx.doi.org/10.2139/ssrn.3604670>.
- Rose, D., & Meyer, A. (2000). *The future is in the margins: The role of technology and disability in educational reform*. <http://eric.ed.gov/?id=ED451624%20>
- Rose, D., & Meyer, A. (2002). *Teaching every student in the digital age: Universal Design for Learning*. Assn for Supervision & Curriculum.
- Salmi, J., & D'Addio, A. (2021). Policies for achieving inclusion in higher education. *Policy Reviews in Higher Education*, 5(1), 47–72. <https://doi.org/10.1080/23322969.2020.1835529>
- Santamaría Graff, C., Price, J. F., & Coomer, N. (2022). Technology as a bridge to co-create inclusive and equitable learning environments for students with intersectional identities. In J. P. Bakken & F. E. Obiakor (Eds.), *Using technology to enhance special education* (pp. 181-198). Emerald.
- Schön, D. A. (1990). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. Jossey-Bass.
- Schwab, J. J. (1973). The practical 3: Translation into curriculum. *The School Review*, 81(4), 501–522.
- Schwartz, S. (2020, September 24). We all live racialized lives: The “identity work” teachers need to do. *Education Week*. <https://www.edweek.org/teaching-learning/we-all-live-racialized-lives-the-identity-work-teachers-need-to-do/2020/09>
- Sealy-Ruiz, Y. (2023). *Archaeology of self*. <https://www.yolandasealeyruiz.com/archaeology-of-self>
- Serrano, M. M., O'Brien, M., Roberts, K., & Whyte, D. (2018). Critical pedagogy and assessment in higher education: The ideal of ‘authenticity’ in learning. *Active Learning in Higher Education*, 19(1), 9–21. <https://doi.org/10.1177/1469787417723244>
- Shulman, L. S. (2005). Signature pedagogies in the professions. *Daedalus*, 134(3), 52–59.
- Shutkin, D. (2005). Neoliberalism, the technological sublime, and techniques of the self. *Educational Technology*, 45(2), 39–48.
- Silverstein, L. M. (2019). *Authentic partnerships, advocacy and reflection: Creating inclusive, culturally responsive community college mathematics classrooms* [Doctoral dissertation, University of Colorado at Denver]. ProQuest. <https://www.proquest.com/docview/2239977366/abstract/D8E7A3DA503E4102PQ/1>
- Sims Bishop, R. (1990). Mirrors, windows, and sliding glass doors. *Perspectives*, 6(3). <https://scenicregional.org/wp-content/uploads/2017/08/Mirrors-Windows-and-Sliding-Glass-Doors.pdf>
- Solorzano, D. G., & Yosso, T. J. (2001). From racial stereotyping and deficit discourse toward a critical race theory in teacher education. *Multicultural Education; San Francisco*, 9(1), 2–8.
- Stein, S. J., Isaacs, G., & Andrews, T. (2004). Incorporating authentic learning experiences within a university course. *Studies in Higher Education*, 29(2), 239–258. <https://doi.org/10.1080/0307507042000190813>
- Stephens, N. P. (2014). Toward a more substantive media ecology: Postman’s metaphor versus posthuman futures. *International Journal of Communication*, 8.
- Stone Wiske, M. (Ed.). (1997). *Teaching for understanding: Linking research with practice*. Jossey-Bass.
- Strandbrink, P. (2018). Disciplinarity and normative education. *Educational Philosophy and Theory*, 50(3), 254–269. <https://doi.org/10.1080/00131857.2017.1343113>
- Suzuki, N. (2017). A capability approach to understanding sport for social inclusion: Agency, structure and organisations. *Social Inclusion*, 5(2), 150–158. <https://doi.org/10.17645/si.v5i2.905>
- Tettegah, S. Y. (2016). The good, the bad, and the ugly: Color-blind racial ideology and lack of empathy. In H. A. Neville, M. E. Gallardo, & D. W. Sue (Eds.), *The myth of racial color*

- blindness: Manifestations, dynamics, and impact* (pp. 175–190). American Psychological Association. <https://doi.org/10.1037/14754-011>
- Triano, S. (2000). Categorical eligibility for special education: The enshrinement of the medical model in disability policy. *Disability Studies Quarterly*, 20(4). <https://doi.org/10.18061/dsq.v20i4.263>
- Vaccaro, A., & Newman, B. M. (2017). A sense of belonging through the eyes of first-year LGBPQ students. *Journal of Student Affairs Research and Practice*, 54(2), 137–149. <https://doi.org/10.1080/19496591.2016.1211533>
- Watson, T. J. (2008). Managing identity: Identity work, personal predicaments and structural circumstances. *Organization*, 15(1), 121–143. <https://doi.org/10.1177/1350508407084488>
- Wiggins, G., & McTighe, J. (2005). *Understanding by design*. ASCD.
- Wolbring, G. (2012). Citizenship education through an ability expectation and “ableism” lens: The challenge of science and technology and disabled people. *Education Sciences*, 2(3), 150–164. <https://doi.org/10.3390/educsci2030150>
- Wood, N., & Waite, L. (2011). Scales of belonging. *Emotion, Space and Society*, 4(4), 201–202. <https://doi.org/10.1016/j.emospa.2011.06.005>
- Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, 8(1), 69–91. <https://doi.org/10.1080/1361332052000341006>