# Designing for Creative Learning Environments

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In this chapter, we discuss fundamental principles that define a creative learning environment and how these can be integrated into pedagogical design. Utilizing research, a creative environment instrument, and diverse learning settings as a springboard, we emphasize the link between a learning environment’s design and how it nurtures creativity. We propose the use of the SCALE (Support for Creativity in a Learning Environment) instrument (Richardson & Mishra, 2018) as a frame for understanding and evaluating the characteristics of creative learning environments. Using the SCALE’s constructs—characteristics of the environment, learning climate, and learner engagement—as benchmarks, we consider how these offer criteria to build into the design of learning environments. We examine the theoretical underpinnings of creativity, creative environments, and learning, identifying gaps in classroom research that the SCALE instrument can bridge. This chapter discusses applications of these principles across various environments, including online and blended spaces, acknowledging that different environments present distinctive affordances, opportunities, constraints, and possibilities. Our implications take a future-oriented perspective on online creative learning environment design in both research and practice.

Creativity is one of the most coveted qualities of thinking, (Lewis, 2009) bringing social, emotional, cognitive, and professional benefits (Sternberg, 2006). While education has increasingly framed creativity as a key element of teaching and learning, this rhetoric has rarely been realized in formal learning settings, partly due to traditional school limitations. In schools, the steady march of standardized testing restricts teachers’ and students’ creativity. Even in higher education, traditional structures and assumptions still permeate learning settings and designs. Creativity is not a discrete subject matter to be taught, memorized, or drilled—rather, it develops when the learning environment is deliberately designed to encourage and nurture it. Most of the attention on classroom creativity has focused on pedagogical practices or curricula. Teachers’ roles in designing learning environments to support creative expression are often overlooked. This gap becomes starker when we consider the design of online/virtual learning environments, where even less scholarship exists on the design of creative spaces.

In this chapter, we delve into the fundamental principles that define a creative learning environment and how these can be integrated into pedagogical design. Utilizing research, a creative environment instrument, and diverse learning settings as a springboard, we underscore the pivotal link between a learning environment’s design and the nurturing of creativity. We propose the use of the SCALE (Support for Creativity in a Learning Environment) instrument (Richardson & Mishra, 2018) as a frame for understanding and evaluating the characteristics of creative learning environments. Using the SCALE’s core constructs—characteristics of the environment, learning climate, and learner engagement—as benchmarks, we consider how the constructs might be seen as criteria to be embedded in the design of learning environments. We examine the theoretical underpinnings of creativity, creative environments, and learning, identifying gaps in classroom research that the SCALE instrument can bridge. Then, we share applications of these principles across various environments, including online and blended spaces, acknowledging that different environments present distinctive affordances, opportunities, constraints, and possibilities. Our implications take a future-oriented perspective on online creative learning environment design in both research and practice.

## Theoretical Foundations

#### Creativity: The Myths and Realities

Creativity is often defined as the process of creating ideas, artifacts, processes, and solutions, that are novel and effective (Cropley, 2003); or, as Runco and Jaeger (2012) articulated as “original” and “effective” in their standard definition. This two-part definition is deceptively simple. The very notion of creativity intimidates many people, as it is often seen as only available to the special or gifted. But, this view of creativity, as only for a select few, is problematic. According to Starko (2013), learning is integral to the creative process, and Guilford (1950) argued that creativity is a form of learning. Creative learning goes beyond academic knowledge and skills to help address the ever-evolving challenges of a changing world. It emphasizes learning creatively and applying knowledge in uncertain contexts (Beghetto, 2021), rejecting the notion of one correct answer. Allowing for uncertainty cultivates creative identities that embrace the complexity of creative processes (Craft et al., 2007).

This complexity can be daunting. When faced with creative thinking or problem-solving challenges, people often hesitate to self-identify as “creative” or are uncomfortable engaging in intellectual risk-taking and open-endedness (Weisberg, 2006). The inherent uncertainty and open-endedness of creative work can be emotionally and mentally taxing, requiring environments that are psychologically safe and supportive as well as dynamic and interesting.

The hesitancy that many feel about identifying as “creative” may relate to how creativity has historically been mythologized as an inherent trait, rather than a developed habit of mind or approach to the world (Cropley, 2016). For thousands of years, creativity has been seen as enigmatic, with Plato once attributing it to the influences of “the muse” (Rothenberg & Hausman, 1976). This myth contrasts with views of many creativity researchers today, who see it as an ability that may grow, flex, and expand through intentional development. Yet, popular myth still views creativity as innate—impervious to development or augmentation (Henriksen et al., 2017). Despite rhetoric about the importance of fostering creativity, most education systems still default to an instrumentalist view of teaching and learning. Prevailing policy tends to constrain or offer no support for teacher creativity, leaving many people uncertain about their individual creative potential. By viewing teachers as empowered designers of creative learning environments, rather than enactors of pre-set content, we might create the conditions for creativity to thrive in education (Benedek et al., 2021)—especially in the design of online learning environments, which are sometimes seen as more remote, removed, and less creative. However, we need to be aware of conditions that support learner creativity—e.g., what does creativity research suggest about creative learning environments?

### Creative Environments

Creative environment refers to how a particular context or setting facilitates or influences creativity (Richardson & Mishra, 2018). This includes the psychological, pedagogical, and physical factors of a formal learning environment (in-person or online) or non-traditional learning spaces like museums or gardens (Jindal-Snape et al., 2013). Considering the architecture of an environment, we are influenced by Latour’s (2005) actor-network-theory (ANT), Gibson’s affordance theory (1979), and Dirkin and Mishra’s (2010) idea of “zone of possibility.” Though closely aligned, these frameworks differ subtly in emphasis. ANT suggests that all elements within a network, including non-human entities like the physical environment or technology, play an active role in shaping interactions and outcomes. Gibson’s affordance theory emphasizes the interaction between the possibilities an environment offers (i.e., its “affordances”), and the resulting effect on individuals’ capabilities within that space. Finally, Dirkin and Mishra suggest that every technology works within the “zone of possibility”—or the range of potential actions, behaviors, or outcomes that are achievable within a given context or set of conditions. Each of these theories or approaches is neutral regarding the nature of the “space,” whether physical, online, or blended. The key is that the architecture of the environment can facilitate or hinder communication, collaboration, exploration, and innovation, influencing the quality and nature of learning and creative outcomes.

Creative environments support the pursuit of interests and passions, engage students in co-creation/collaboration, value students’ ideas, and embrace mistakes as a part of learning (Chan & Yuen, 2014). Curiosity-driven activities like exploring new media technologies, fantasy play, outdoor activities, model making, building, planning, and engaging in other design tasks can also foster creativity. Creative environments benefit students in many ways, including increasing personal achievement, GPAs, reasoning abilities, confidence, resilience, motivation, engagement, critical thinking, and problem-solving skills (Jindal-Snape et al., 2013). Such environments promote cooperation and encourage students to take reasonable risks and learn from mistakes. A learning environment is a community, and the values embodied within that community influence members’ behaviors. Values, such as those that support creativity,can be operationalized and embedded within explicit roles, norms, and designed elements of a community. Learning designers, teachers, and students have a part to play in supporting or constraining creativity (Peppler & Solomou, 2011).

The role of the environment encompasses the physical space, interpersonal relationships, and the availability of resources and support (Beghetto & Kaufman, 2014). But, despite the growing interest in creativity research, creativity assessment tools have often overlooked the impact of environments, focusing instead on personality factors or psychological elements, which teachers have less influence over. For instance, in a review of creativity instruments, Henriksen et al. (2015) found that only 3% of existing creativity instruments measured creative environments, which is surprisingly low considering the environment’s influence on creativity (Beghetto & Kaufman, 2014). Moreover, less than 20% of the already small portion of creative environment measures were specifically designed for K-12 students. Speaking to this gap, Richardson and Mishra (2018) designed a tool known as the SCALE, which identifies and evaluates the elements of creativity within learning environments. This tool has become a highly cited and widely used measure for assessing creative learning environments, offering a structure of constructs that pinpoint creative environment characteristics that teachers and learning designers can focus on to support creativity (Cullingford, 2007; Cheng, 2019; Hamid & Kamarudin, 2021; Huang, 2020; Jaatinen & Lindfors, 2019; Katz‐Buonincontro & Anderson, 2020; Ovbiagbonhia et al., 2019). Since practitioners can benefit from clear principles or a frame to guide their efforts in the design of creative learning spaces, we outline key principles from the SCALE.From there, we consider how they might be applied to more varied learning settings.

## Framing the Principles of Creative Learning Environments: The SCALE

#### What is the SCALE?

The Support for Creativity in a Learning Environment (SCALE) is a practical tool that assists education professionals in designing creative learning environments by identifying and measuring aspects of the physical environment, learning climate, and learner engagement (Richardson & Mishra, 2018). The SCALE tool consists of 14 items related to the (a) physical space and available resources and materials (4 items), (b) classroom atmosphere and relationships (4 items), and (c) tasks and activities that students are engaged in (6 items) (see Table 1). These items are rated on a four-point Likert scale from “no evidence” (0) to “high evidence” (3).

Although the SCALE instrument was developed in the context of K-12 education, we believe the underlying principles apply across contexts and learner ages—i.e., in-person, online and blended; and for learners in K-12, higher education, and adult education spaces. Context and setting clearly matter, but we believe that these principles are adaptable and flexible. Although their instantiations may vary across settings and contexts, the core ideas are transferable and applicable beyond K-12. These broader principles hold true, even while playing out differently in a 4th grade math class or a college English course, or in-person classrooms versus online/blended contexts. In various settings from K-12 to higher education, cases’ contextual variables may influence or constrain the implementation of the core ideas. However, the core ideas provide a valuable foundation for teachers and learning designers to create, build on, and contextualize environments that support creativity.

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| **SCALE Components** |
| Physical Environment: | * A variety of resources/supplies are available and accessible to students.
* Examples of student work appear in the space.
* A variety of workstations or areas are available to students.
* The furniture allows for multiple arrangements and configurations.
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| Learning Climate: | * Students are involved in discussions among themselves, with or without the teacher, that deepen their understanding.
* The students are caring, respectful, and value differences.
* The teacher is a facilitator, co-learner, explorer, or inquirer with students.
* Mistakes, risk-taking, and novel ideas are valued or encouraged.
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| Learner Engagement: | * Students are involved in tasks that are open-ended and/or involve choice.
* Students are involved in activities that may include inquiry, project-based learning, or interdisciplinary tasks.
* Students use multiple perspectives/viewpoints/ways of knowing or various modes of investigation/problem solving.
* Students demonstrate interest in or enthusiasm for the activity beyond being “on task.”
* Students spend time developing ideas for deeper understanding and/or reflecting on their learning.
* Students work at their own pace and/or time is used flexibly.
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### Key Ideas Supporting the SCALE Principles

The SCALE tool aims to assist teachers and administrators in identifying, measuring, and adjusting learning environmental variables that directly impact creativity as well as individuality, independence, and risk-taking (Lilly & Bramwell-Rejskind, 2004).

The first component of the SCALE tool consists of four items that identify and measure specific aspects of physical environments. In related literature, examples of environmental variables include “lighting, color, decorations, furniture, resources, sensory variables, space configurations, and class size” (Warner & Myers, 2009, p. 30). One of the environmental variables emphasizes the need to make a variety of resources available and accessible, including tools and materials to experiment with ideas and information to creatively solve problems (Peterson & Harrison, 2005). For instance, hyper-content textbooks—which connect content in books to online learning resources through links, barcodes, and augmented reality—have been used to enrich learning experiences and facilitate differences in learning characteristics (Surahman et al., 2021). Also, furniture designs should be psychologically appealing and provide a sense of comfort and safety. Space configurations should be flexible with areas for students to move around and communicate (Warner & Myers, 2009). For example, classrooms have been redesigned to enable active communication and interaction among students, with wheeled lecterns and chairs, round tables, and LCD screens connected to docking systems on tables (Park & Choi, 2014). Additionally, decorations, such as displays of student work, may prompt creativity and lead to new ideas by offering opportunities for reflection and metacognitive thinking (Eckhoff, 2019; Warner & Myers, 2009).

### Learn More About Designing Physical Environments that Support Creativity

The second component of the SCALE tool consists of four items that identify and measure aspects of learning climates. These items focus on the influence that classroom atmosphere and teacher-student/student-student relationships have on creativity. Students need opportunities to explore and express ideas in learning climates that encourage “mistakes, risk-taking, innovation, and uniqueness, along with a certain amount of mess, noise, and freedom” (Edwards & Springate, 1995, p. 4). In these climates, teachers can become powerful aids in fostering creativity by exploring alongside students while facilitating meaningful activities with open-ended discussions (Craft, 2001; Edwards & Springate, 1995). For example, in STEM classrooms, teachers have designed and implemented problem-based learning activities (based on engineering design processes) where students reflect on and productively learn from their successes and failures (Henriksen et al., 2021). Moreover, as students often model the behaviors of their teachers (Gillies, 2006), teachers can encourage students to be caring, respectful, and appreciative of differences by (a) making them feel worthy and loved, (b) showing respect for their ideas, and (c) searching for connections between different ideas and ways of knowing (Craft, 2001; Esquivel, 1995). For instance, teachers can promote critical thinking and enhanced engagement in whole-class discussions on controversial questions by prompting reciprocal interactions and respectful exploration of differences (Henriksen et al., 2022).

### Learn More About Designing Learning Climates that Encourage Risk-taking and Creativity

The third component of the SCALE tool consists of six items that identify and measure aspects of learner engagement. With a focus on the design of tasks that students are involved in, these items examine pedagogical practices, techniques, and methods that can be used to support creativity. As learning is a fundamentally social activity, teachers need to utilize constructivist-based pedagogical practices that enable students to frame and generate meaning with others (Dawson & McWilliam, 2008). Research on creativity in early childhood education has demonstrated that students benefit from long-term, open-ended projects that integrate different subject areas and lead to exploration (Edwards & Springate, 1995). For instance, in STEAM classrooms, teachers have used project-based learning processes to guide students through conducting in-depth research on real-world issues and drawing on information from multiple disciplines to brainstorm possible solutions (Henriksen et al., 2019).

In project-based learning processes, creativity can be supported by giving students more choices regarding what problems they will solve and how much time they will be given to complete work. This support may increase interest, engagement, and learning (Craft, 2001; Greenberg, 1992; Patall et al., 2010). For instance, virtual labs have been designed to let students work at their own pace and address teaching challenges related to (a) simultaneously facilitating learning at preferred paces and (b) maintaining learning motivation and engagement (Lynch & Ghergulescu, 2017). Further, the Creative Problem-Solving method (an active learning process embodying collaborative inquiry concepts within a constructivist paradigm) has been used to foster ingenuity and creativity and enhance motivation. This method utilizes critical reflection, critical thinking, and exploration of possible perspectives and solutions (Samson, 2015). Craft (2001) noted various ways to foster creativity in classrooms—viewing practices, techniques, and methods as an adaptable toolbox to craft each learning environment.

### Learn More About Designing Tasks to Increase Learner Engagement

The SCALE tool was designed to assess student creativity in learning environments and guide teachers in supporting and facilitating creativity (Richardson & Mishra, 2018). Its principles have been applied to diverse learning environments, including teacher education, online education, and STEAM programs (de la Peña et al., 2021; Ozkan & Topsakal, 2021; Wahyudi & Winanto, 2018). The SCALE tool has also been used to better understand ways to enhance creativity-fostering practices with emerging technologies (e.g., virtual/augmented reality, 3D design software) (Bereczki & Kárpáti, 2021; Chen et al., 2022). We propose key implications that can transfer to online environments while also supporting creativity within those same environments.

## Implications for Practice

The SCALE is not just a measurement tool. It also embodies, in its structure, a set of principles that can help design environments that support creativity—these principles could be used from a pedagogical design standpoint to shape creative learning environments, both in physical and online/blended spaces. That said, we must recognize that affordances and constraints offered by technologically mediated online or blended spaces can differ significantly from those offered by physical spaces. In the sections below, we take each of the three main constructs of the SCALE instrument (Physical Environment, Learning Climate, and Learner Engagement) and discuss how teachers and learning designers might factor these into online and blended learning.

### Physical Environment

The meaning of the “physical environment” changes when we consider online and blended learning spaces. One might argue that online and blended spaces offer greater flexibility to designers since they are relatively unconstrained by the geography of space, the materiality of objects, and maybe even the laws of physics. This gives designers of online/blended systems more flexibility to create a “conceptual” playground for students to engage with each other and with ideas. Yet, designers of online and blended environments are often constrained by capabilities of current technological systems and contextual factors outside of their control, such as the students’ physical surroundings, possible distractions, and disruptions. Thus, online and blended setups may be freeing in some respects and limiting in others. An additional constraint may also be the instructor or learning designers’ inability to imagine possibilities and opportunities in existing technologies. For instance, they may seek to replicate existing processes/structures of in-person learning that may not transfer effectively to technologically mediated contexts. This was evident when teachers were forced to teach online during the pandemic. There was a strong urge to replicate conventional structures instead of opening the classroom to the lived world of students and engaging in more project-based learning experiences and innovative practices.

The underlying principle of adaptability and configurability could be translated into the design of online and blended learning environments, creating digital spaces that allow multiple arrangements and configurations to suit diverse needs and preferences. Yet, many existing online learning tools/platforms or modes offer limited adaptable features and opportunities to completely redesign spaces or rethink assumptions. Ideally, platforms could allow users (i.e., not just learning designers but also teachers and students) to rethink and play with layouts in ways that align with their own preferences or needs, including flexible organization of resources and adjustment of accessibility features.

One of the benefits of online or blended learning environments is that students can easily be given a wide array of readily accessible digital resources and supplies. The goal is to include elements that allow a wider range of creative experimentation, help students appreciate the achievements of peers, and make the learning environment a space for fostering collaboration and improvement. A few suggestions in this regard include:

* utilizing diverse digital resources (e.g., software applications, digital libraries, and creative tools) to give students creative options to explore and experiment;
* offering different areas, discussion spaces, or online workspaces that cater to different modes of creativity; and
* seeking opportunities for students to share their digital work within learning spaces and, potentially, externally with others in the community and the wider world (e.g., creating blogs, videos, portfolio websites, or public digital articles)

### Learning Climate

A learning climate that supports creativity depends on the nature of the relationship between teachers and students. This relationship cannot be based on power and fear but should instead be based on trust and respect. The norms of learning spaces should emphasize that the creative process can be messy and nonlinear, and mistakes and failures are to be expected. Teachers and students must be present—physically, cognitively, and emotionally. In this, online and blended spaces have a fundamental disadvantage. Online tools often do not afford the kind of social presence that being in a physical space with other people provides. Online and blended spaces lack the breadth and depth of communication modalities that physical presence provides, which in turn deepens social and emotional distance between participants. Individuals in learning communities need ways to convey their social and emotional selves as authentic beings engaged in shared tasks.

There are a variety of strategies that teachers and learning designers can utilize to address this limitation of technologically mediated educational spaces. These may include the following:

* providing opportunities for the affective aspect of learning to emerge through meaningful discussions and prompts
* using video tools to help enhance social presence—e.g., online office hours, video announcements/messages, or video conferenced meetings (though the mere utilization of video as a communication medium is rarely enough)
* establishing norms for respectful and empathetic communication where difference and play are encouraged and valued
* ensuring students realize it is okay to take risks, explore unconventional solutions, and think divergently—without punishment for mistakes
* experimenting with formative activities (e.g., ungrading or providing multiple opportunities to generate solutions)

### Learner Engagement

Social presence is as important to learner engagement as it is to classroom climate. Assuming that the instructor is focused on enhancing and supporting the learner presence, the next thing to factor in is the design of the tasks and activities. Students are autonomous agents who drive their own learning—they want to learn with rather than be taught to (or at). Thus, student choice becomes important in designing learning environments that support creativity. This often takes the shape of open-ended tasks where students have some autonomy in selecting the tasks (or aspects of tasks) and the ways they would like to approach them. Engaging students in inquiry-based, project-based, and interdisciplinary activities promotes their creativity, encouraging them to delve deeper, make connections, and generate innovative solutions. Students who engage in activities that encourage a deep dive into a topic, exploring connections across disciplines and developing their own questions and hypotheses, become genuinely interested and are more likely to invest in their creativity and produce meaningful and innovative work.

One advantage of online and blended learning environments is the flexibility that lets students work at their own pace and manage their time effectively during more in-depth projects. Online settings allow students to structure their workflow and pace themselves, with the (possible) ability to customize deadlines to meet individual needs. That said, there must be a balance between structure and flexibility, providing clear expectations that allow students to plan and manage their learning. Several ways teachers can factor these ideas into their teaching include the following:

* designing projects, challenges, and problem-solving activities that allow students to explore different possibilities and leverage their strengths
* embracing multidisciplinary approaches, letting students apply their creativity to real-world problems, deep investigations, and innovative solutions
* showing genuine interest and enthusiasm through activities that tap into students’ passions through self-directed projects
* integrating multimedia elements, increasing opportunities for students to pursue projects related to their interests
* providing time for idea development, reflection, and flexible pacing to enhance students’ understanding, connections, and insights

## Conclusion

We tend to think of teaching and learning as processes that take place in the minds of students, teachers, and ourselves. Thus, we often think about educational design in terms of how pedagogy influences learning as a mental process. Certainly, cognition is central to learning, but it is important to also consider how human thoughts and behaviors are influenced and driven by the environments we create; and environments are inherently a human construction. At some level, the human environment is “made up,” in that it is constructed by people for a purpose and thus can be remade or shaped differently to fulfill different purposes—like learner creativity. Environments can be changed, shifted, redesigned, recreated, and reimagined.

### Think About It!

#### Consider How Education is Designed and Could Be Redesigned

In doing design or redesign work, learning designers need thoughtful principles framed by a sense of the environmental factors that influence learning and creativity. This is where we suggest the application of an environmental frame, such as the principles found in the SCALE instrument, to guide the design and construction of creative learning environments from a comprehensive physical/virtual, cognitive, behavioral, and perceptual lens. One of the ultimate goals of education is to prepare students for the future, which is inherently uncertain and requires creativity. In that sense, building creative learning spaces is one of the most important tasks we can undertake toward that fundamental creative purpose of teaching and learning.

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