

Designing for Creative Learning

How Instructional Designers Can Influence the 5As of Creativity

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Abstract

Fostering the kind of learning we want for students is difficult in any domain, but even more so when the goal is to develop students capable of engaging in creative collaborations within their disciplines. Still, because the need is so great for developing creative professionals to solve the wicked problems of society, instructional designers will often seek to design education that can develop the attributes necessary for creative collaborations. In this chapter, we discuss the nature of instructional design as a profession, and how designers seek to influence learning. We employ Glaveanu's 5A Framework to define the elements of creativity that instructional designers can attempt to influence—namely, the actors, activities, artifacts, audience, and affordances that enable creativity. We then provide specific examples of how designers seek to foster student creativity in each of the 5As through pedagogies, practices, and instructional choices—providing examples of movements such as studio-based learning, makerspaces, open-ended learning, and social learning as effective strategies. We conclude with recommendations for how instructional designers and teachers can enhance the potential for student creativity, as well as cautions against problematic strategies that can increase barriers.

Keywords: creativity, education, instructional design, innovation, learning sciences

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Introduction

Cognitive scientist Herbert Simon in 1969 argued that design is a way of thinking and problem-solving common to many professions. He explained that, simply, a designer “devises courses of action aimed at changing existing situations into preferred ones” (p. 111).

Consequently, one can argue what teachers, instructional designers and a range of other educational professionals do is design. The goal, of course, being to take the learner from their existing state within a domain to a deeper state of understanding or ability.

Thus, helping that learner achieve that preferred state is the goal of an instructional (or sometimes called learning) designer. Simply, an instructional designer uses design processes, design skills, theoretical and content knowledge, and design expertise to create strategies to assist a learner to grow and develop. In these ways, they are similar to teachers who seek to influence their students’ intellectual growth. That said, in contrast to teachers who are often directly involved in their students’ learning, instructional designers typically create products, systems, or technologies in advance of the educational moment, and often to be used apart from their own direct involvement. As Wagner (2021) explained, “As learning designers, we have profound opportunities to develop conditions, strategies, resources, tools, and platforms that will keep learners engaged and inspired. We can help people make new connections and meanings, spark new interests, and develop new abilities so that new learning will occur” (para. 3). In this way, they are partners with teachers in creating instructional moments and experiences.

Thus, instructional (or learning) designers can be instrumental in assisting learning in various ways, including through additive methods (such as creating better content, technologies, or strategies to assist the learning), or subtractive methods (such as removing barriers to learning, eliminating distractions or things that demotivate learners, or even rethinking policies and

practices that are limiting learning). Through it all, instructional designers focus on the learners, their needs, and their contexts, as well as somewhat predetermined desired learning outcomes. In other words, these outcomes are how instructional designers seek to achieve Simon's definition of design of "changing" existing situations into preferred ones.

Designing for Creative Learning

When seeking to design for learning, instructional designers sometimes work on well-structured problems such as "how can we assist a learner in understanding multiplication?" Often, though, they work on much more complex kinds of learning—and assisting learners in developing their creative potential is certainly high in complexity. We have found that instructional designers can, indeed, influence and benefit the development of creativity, but to do so we need to appreciate the complex weaving of individuals, actions, mediating tools, and relationships that are part of creativity and the creative process.

This of course requires understanding what creativity is and how it plays out in practice. One such framework that can be helpful in this regard is the 5As framework proposed by Glaveanu (2013). Glaveanu provides a systemic, sociocultural framework where actors, actions, audiences, artifacts and their affordances need to connect synergistically to produce creativity. As Glaveanu explained, "the actor exists only in relation to an audience, action cannot take place outside of interactions with a social and material world, and artifacts embody the cultural traditions of different communities." These 5As provide a framework for understanding the various dimensions that instructional designers can intentionally influence to support learners in their pursuit of creative outcomes.

For instructional designers the 5As framework has some relatively straightforward implications for the design of engaging learning experiences that enhance creativity. The first

step is to recognize that learners are active “actors” in their own learning, who through their “actions” need to genuinely engage with an “audience” (which may be the classroom or the broader world), to create new “artifacts” recognizing specific material and sociocultural “affordances.” Specifically taking each of these components in turn, instructional designers can influence or support creativity in learners by doing the following:

1. **Seeing learners as Actors:** Ensure that learners have the autonomy to make decisions, explore ideas, and take ownership of their learning process. Design activities that empower students to develop their own solutions and strategies, fostering a sense of responsibility and self-efficacy.
2. **Focusing on Actions:** Emphasize the process of learning, rather than just the final product. Design activities that encourage experimentation, iteration, and reflection, allowing students to learn from their mistakes and make improvements as they progress.
3. **Emphasizing the creation of Artifacts:** Encourage the production of tangible outputs, deliverables, or performances that represent understanding and application. These can be both material or conceptual in nature and can include visual representations, models, prototypes, theories or other creative expressions that showcase their learning progress.
4. **Acknowledging the role of the Audience:** Acknowledge the importance of social interactions and collaboration in the learning process. Design activities that require students to present, share, and discuss their work with peers, teachers, or even external stakeholders, promoting constructive feedback and diverse perspectives.
5. **Understanding Affordances:** Consider the resources, materials, and tools that can best support students' creative work. These affordances go beyond the material to understanding the broader sociocultural matrix within which learning functions. Thus,

instructional designers ensure that the learning environment offers a variety of opportunities and stimuli for exploration and discovery, within and outside of the learning environment.

That said, the 5As do not exist in isolation from each other. In fact, the strength of the framework lies in recognizing that these five components are in a dialogic, transactional relationship with each other, sometimes in tension and sometimes complementing one another. It can be argued that these interrelationships are what lead to creative outcomes. This means that instructional designers need to go beyond the individual components (which are necessary but not sufficient) to truly support student creativity. Thus, designers should look to create holistic experiences where learners see themselves as actors empowered to act, by understanding the affordances of the context and the materials, to create artifacts that can be shared and assessed by an audience. This creates a dynamic, engaging, and collaborative environment that nurtures genuine creativity, one that respects the agency of the individual yet recognizes its deeply socio-cultural, contextually embedded nature.

A key characteristic of instructional designers, for us, is their *intentionality*. Thus, we believe that while creativity is difficult to define, capture, or force, instructional designers can *intentionally* intervene. This intentionality can be exhibited in both formal (e.g. classrooms, curriculum, and courses) and informal (e.g. museums, on-the-job learning, and internships) experiences where creativity may be fostered. In this chapter, we will describe intentional strategies that instructional designers can apply to assist learners in developing their creativity within the 5As framework. In doing so, we refer to both formal examples and cases, as well as informal ones, and conclude with suggestions for how creativity psychologists/scholars, teachers, and instructional designers can combine efforts to *intentionally* assist people in developing their

creative potential. While we will discuss each of Glaveanu's 5As in turn as an organizational practice for this paper, we reiterate that the main focus of Glaveanu was in the interconnection of these aspects of creativity, making the concepts more of a gestalt than isolated factors. Despite this challenge, we will attempt in each section to define the category, before then discussing some examples for how instructional designers have specifically focused on that part of the framework.

Designing to Develop Creative Actors

Defining Actors

Glaveanu (2013) purposefully uses the word *actor* in his model in part to de-emphasize the traditional perception of a lone genius creating novelty based solely on individual traits and talents. Instead, Glaveanu emphasized that individuals are actors working as “socialized selves, as beings that are shaped by a sociocultural context and act from within it, in coordination with others” (p. 72). In this way, creativity is understood to be something individuals engage in through their interactions with a social environment, based on previous interactions with this environment, and in order to produce something novel and helpful to others within that sphere.

Instructional Design Examples and Implications

Instructional designers can intentionally influence the creativity of learners in a variety of ways. The first, and maybe most important, is by helping learners to see themselves not as passive respondents but rather as active agents, i.e. actors with agency. Furthermore, instructional designers support this development of agency by designing opportunities and fertile environments for learners to grow their creative muscles, recognizing both their individuality as well as its interaction with the broader social context. In contrast with a more traditional style of teaching that emphasizes the decontextualized transmission of knowledge from the expert

teacher to the novice student—a style of teaching that is rarely effective—instructional designers instead can seek to help learners become more aware of their socialized selves and how they can grow their creative potential through mentored exchanges with teachers and peers, around authentic problems to be solved. In doing so, the instructional designer emphasizes (a) the growth needs of the learner as well as (b) the messy learning of equally messy authentic problems, and the broader social context these problems (and potential creative solutions) exist within.

One common strategy for growing learner creativity is through education that emphasizes learner agency through choices in how to engage with the domain. Jónsdóttir (2017) explained that “being creative requires agency, defined as the control individuals have of their actions and lives” (p. 128). Creativity-fostering classrooms emphasize this agency by letting learners control some measure of what, when, where, and how they learn. This learner agency can be designed into education in many ways, unique to each learning context. For example, learners can be given choices in what topics to study to learn a particular skill, what resources to use to study that topic, and what kinds of projects to complete to demonstrate their learning.

One example of education that emphasizes learner agency is the Genius Hour approach (Downes & Figg, 2019), typically employed in primary and secondary education. Genius Hour is school time set aside for students to work on a passion project of their own choosing (McNair, 2022), while the teacher serves more as “an architect, designing the seemingly invisible ecosystem” to support the students (Spencer, p. 2017). Students then showcase their projects to the school community and describe what they learned in the process. This type of instructional practice can not only give space to students to develop creative skills and attributes, but also change perception of school as a place where they go to create in contextually responsive ways,

rather than memorize, decontextualized information. Similarly, in higher education there can be opportunities to give students the space and tools to develop their creativity by providing choices and relatively risk-free opportunities to explore ideas. Stackable, microlearning opportunities are one way to provide students choices about what they can learn within a course (Randall, Harrison & West, 2013).

As part of providing learners choices in their education, instructional designers can support creativity by acknowledging the role that failure and risk-taking play in developing creativity (Smith & Henriksen, 2016), and designing an environment where this failure can be seen as productive. One way to do this is by engaging students in problem-solving activities first, without direct instruction. This strategy encourages students to try multiple solutions with assurances that it is ok for them to fail and even not arrive at a correct answer. A recent meta-analysis of this approach of over 53 independent studies found that this method had a significant, moderate positive effect on learning (Sinha & Kapur, 2021).

Variations on this idea of productive failure may include some instruction before the problem-solving, but a common feature is that student failure is seen as a designed feature in the education, not a bug. When the students fail, skilled instructors and support technologies can help them understand the reasons why—a process that’s been called *backward gazing* (Stretch & Roehrig, 2021). These authors argue that this reflective process can create powerful learning and encourage future creative problem-solving by applying the lessons learned to create new solutions through *forward gazing*.

To design effective failure into education is to rethink the curriculum completely: Instead of designing objectives and then “working backwards” to create direct instruction of those objectives, the instructional designer could focus on (a) creating opportunities for students to

generate many ideas to a solution, (b) helping students run effective experiments of these ideas, and (c) helping them shift their perspective about failure, accepting it as part of the process (Matson, 1996; Tahirsylaj, 2012). This last step requires significant rethinking of educational assessment towards de-emphasizing the “bell curve” model that adds too much risk and competition for students to believe in safe failing. These traditional assessment practices “end up ignoring the creative/artistic process” and “damage a pedagogy of play and creative experimentation” (Smith & Henriksen, 2016, p. 11). Thus, designing for better creative learning in education also signals the need to design better assessment practices.

In addition to designing learning environments that emphasize choice and effective failure, instructional designers can explicitly target creative skills in learners for development, much like they target cognitive skills. For example, research has shown that skills such as divergent thinking (Acar & Runco, 2019), openness to experiences and ideas (Feist, 2019), abstract thinking (Dou, et al., 2021), and idea evaluation (Hao et al., 2016) are key to creativity. While traditional schooling often overlooks these skills, instructional designers can design learning experiences specifically to gain these abilities. For example, improvisational teaching can teach students to avoid premature closure by asking, “yes ... and” to develop ideas. Assignments can ask students to generate as many ideas around a topic as possible, instead of giving just one answer for class discussion. Students can be asked to generate ideas individually before group work, to avoid groupthink, and then during their collaborative time together, taught skills of group idea evaluation.

In addition to these strategies for designing formal learning environments for creativity, instructional designers are often asked to design informal learning experiences to foster these skills. For example, instructional designers may create spaces that encourage mindfulness and

mind wandering (Henricksen et al., 2020) or to appreciate and incorporate abstraction or ambiguity into their lives. Examples of these kinds of designed learning experiences could be museums, libraries, studios, collaborative spaces, or experiential learning opportunities. In addition, in corporate settings, instructional designers may purposefully build learner choice into professional development by providing multiple options for just-in-time instruction that is available when the learner needs and requests the instruction (Beckett et al., 2002).

Designing Creative Learning Activities

Defining *Activities*

Learning activities provide opportunities for learners to grow and develop. In the case of creative learning activities, activities can support, while never predetermine, growing creative skills and abilities. As instructional designers seek to develop these creative learning activities, the “actor” (in this case the learner) needs to recognize that they exist only in the presence of an audience. Moreover, any move they make (i.e. “action”) cannot occur outside of interactions with the social and the material world. In this process they create “artifacts”—material or conceptual objects that both embody and probe their cultural traditions of the communities of which they are a part. Finally, all these actions need to recognize that the “audience” is an active, dialogic participant working within a range of affordances and possibilities. Importantly, creativity does not exist by itself, but rather in the interrelations or interaction between these five elements, not just in the elements themselves. Given this focus on interactions, creative activities are understood as social exercises and discussing them requires understanding the broader social and cultural context within which ideas can flourish and grow.

Instructional Design Examples and Implications

Instructional designers can intentionally focus on these social interactions by designing educational activities where success is only possible through engaging with the broader sociocultural context. As one example, the Native American Curriculum Initiative (NACI) in Utah was developed to teach children the history of Native American people within the state. However, to avoid errors from the past in teaching these topics, the NACI engaged with the various Native American tribes and nations to co-design lesson plans, using indigenous concepts, pedagogies, and art (West et al., in press). What emerged was not only learning activities about tribal histories in the state, but also a wider engagement with the indigenous culture and peoples themselves. Thus, children engaging in these activities not only learn content, but cultural awareness, and their interaction with that culture and history, especially through artistic forms.

Moreover, creative ideas, by their very nature, are unpredictable and (to use a cliché) out of the box. This is often difficult for educators (be they teachers or instructional designers) to accept, requiring as it does a willingness to be open to the uncertain and the unpredictable. So, in some deep sense, it requires us to embrace this idea of failure as possibly being productive, and acknowledge that we can design for creativity, even while knowing that it cannot be taught directly. Designers can intentionally redesign educational systems to better accommodate failure through practices such as ungrading (Kohn & Blum, 2020), contract-based grading (Brubaker, 2010), portfolio-based assessment (Lindström, 2006), and open recognition (West & Cheng, 2022).

Foregrounding the dialogic interaction between actors, audiences, and the emerging artifact holds significant implications for how instructional design can be used to develop creativity. According to this framework, instructional designers are “orchestrators” of creativity rather than directors of it. This often requires instructional designers to design differently than in

years past. Instead of designing a lesson or module, they may be working behind the scenes to negotiate connections with communities and industry, create scaffolding to support learners, build in opportunities for collaborations and reflection, and structure time for mentoring. Similarly to how an orchestra conductor does far more than wave a baton in the final concert, the real work of the instructional designer and teachers in these settings is often behind the scenes, but truly felt and experienced by the participants.

A good example of such orchestration is the design of service learning experiences. Service learning, broadly speaking, is an educational approach that combines community service with instruction, emphasizing learner personal development, civic engagement, and social responsibility. Instructional designers who engage in creating service learning pedagogy need to look beyond just creating the curriculum to integrating it with thoughtfully organized service experiences that address current needs in the community. This requires instructional designers to form relationships with the broader community (or community groups), and create the infrastructure and systems that would allow learners to be authentic active participants in problem solving. In addition, instructional designers need to incorporate both action and reflection in their design to help learners see the interdependence between their actions and broader principles and ideas. In terms of enhancing creativity these experiences emphasize personal development, compassion, perspective-taking, social responsibility, and empathy among learners. Learners can also enhance communication, critical thinking, and problem-solving skills and foster open-mindedness towards new people, experiences, and ideas, and can cultivate attitudes and skills that support positive creativity (Celio, Durlak & Dymnicki, 2011; Waterman, 2014)

Designing Creative Artifacts and Affordances

Defining *Artifacts* and *Affordances*

Glaveanu (2015) used the term “artifact” to emphasize the cultural nature of creative products. An artifact is not only a product of a specific creative process but also reflects historical ideas and values. In other words, “Each creation comes into being, is understood, and is valued as part of a larger web of relations of people, things, institutions, and beliefs beyond that particular creation” (Weiner, 2000, p. 254). In addition to a product of a creative process, material artifacts also impact the creative process itself, serving as types of tools or materials with specific affordances, or characteristics that “both constrain and allow creative action” and are “key to the actual shaping of a novel idea” (Glaveanu, p. 75). However, for Glaveanu, the term “artifact” is not limited to physical objects; artifacts also include symbols, words, or ideas that are produced through creative processes. When supporting creative learning, instructional designers both design artifacts to support learning as well as use the process of the production of artifacts as a pedagogical tool.

Instructional Design Examples

As we have seen so far, instructional designers design many different types of things to support creativity. These can include concepts or pedagogical approaches—such as the “genius hour” or “backwards gazing”—as well as creative environments or digital software applications. By Glaveanu’s (2013) definition, each of these can be considered an artifact. Although much of this we have considered throughout this chapter, it is useful to consider the relationship between affordances and creativity and how affordances interact with broader cultural contexts. For example, typical learning management systems (LMS) such as Canvas, Moodle, and Blackboard have design features that lead the user to create content that is sectioned off into “modules” (note, users of LMSs do not have to follow this pattern, but the structure of the software and the

tools it provides make it natural to do so). This reflects the common cultural discourse that defines learning as happening in discrete disciplines (mathematics, biology, etc.) and in discrete time periods (for example, one semester). In fact, the very idea of learning as acquiring information or skills that can be accumulated and built on through modular structures reflects constructed cultural beliefs and not necessarily how “learning” happens in the natural world. This structure “provide[s] people with meanings and resources ready to be seized and used in particular ways” (Glavenau, 2013, pp. 75-76). Instructional designers (as well as other educators) can choose whether to design within these structures or to push against them, but an awareness of the existence of the cultural and historical influences of the artifacts they are using gives them agency to make a deliberate choice in their design work. By being cognizant of the meaning of the tools they are using—often meaning enacted through affordances—they can choose whether or not to continue building on this meaning. Creative actors are often those who “exploit the affordances of his or her surroundings in an innovative way, discover new affordances, and even ‘create’ the ones needed to fulfill a specific action” (Glaveanu, 2013, p. 76).

Because artifacts hold the cultural and historical meaning of their designers, they are an important element of creative work. In fact, Edward Clapp described creativity as residing in the artifact itself, where creativity is “a distributed process of idea development that takes place over time and incorporates the contributions of a diverse network of actors, each of whom uniquely participates in the development of creative ideas” (Warr et al., 2021, p. 13). Artifacts become representations of an idea as it existed at a particular time, and the creation of the artifact helps the creator both develop meaning and reflect on that meaning (Papert & Harel, 1991). This means that participating in the creation of an artifact can be a powerful learning experience.

Efforts to center learning on artifact creation can fall under the broad umbrella of project-based learning (PjBL). In PjBL, learners engage in an inquiry process driven by the need to create something (Lee et al., 2014). This is similar to problem-based learning where activity is structured around a complex problem or question; however, what is unique about project-based learning is the focus on producing a creative artifact (Savery, 2006). PjBL-based approaches afford many of the characteristics for developing creativity described above, such as learner choice, productive failure, and addressing complex problems. PjBL learning environments can support students in creative development through focusing on driving questions of interest to students and providing scaffolding for difficult tasks (Krajcik & Shin, 2014).

Implications for Practice

Instructional designers can play a central role in developing effective PjBL environments. Instructional designers often collaborate with subject matter experts in selecting a core project; determining the supports or scaffolds learners need to be effective; creating a physical space, technologies, and material resources that will assist the learners in the development process; and determining how learning will be assessed and evaluated. For example, Tawfik and Kolodner (2016) emphasized careful sequencing and dedicating adequate time and attention to reflection when supporting problem-based pedagogies. Instructional designers can also enhance creativity in PjBL environments by designing projects that require interdisciplinary collaborations (Warr & West, 2020). The addition of new disciplinary perspectives can push learners to see the project situation with a new lens, leading to creative solutions to complex problems (Wilson & Blackwell, 2013).

A variation on PjBL environments that emphasizes the physical environment for creative learning comes from the Maker Movement, commonly implemented through makerspaces

(Clapp et al., 2016). The Maker Movement describes a community of people who focus on constructing (and deconstructing) physical artifacts (Cohen, 2017). It involves tinkering, problem-solving, and collaborating with others, requiring participants to cross traditional disciplinary boundaries to solve problems (Sheridan et al., 2014). Educators have promoted making in formal and informal learning contexts because it supports learners in integrating disciplinary learning, particularly from STEM disciplines, with the arts. Making emphasizes agency and collaboration as learners work together to create artifacts that are meaningful to them.

Although there are many variations of makerspaces, Clapp et al. (2016) described three categories of “symptoms” of what they call “maker-centered learning”: community, process, and environment. Community includes characteristics such as collaborative learning and participants with diverse expertise; process includes curiosity-driven, experimental, and interdisciplinary problem solving; and environmental characteristics are open and accessible spaces as well as tool- and media-rich environments (although high-tech tools are not necessary to support maker-centered learning, see Clapp et al., 2016). Supporting creativity in makerspaces requires instructional designers to design contexts—be they physical spaces, periods of time, or social structures—that instrumentalize these “symptoms.”

Another pedagogical approach that utilizes the creation of artifacts to support creative learning is studio pedagogy. Studio learning is a traditional form of education in art and design fields, where students complete creative projects under the direction of a disciplinary expert, while receiving frequent (and often public) critiques (McDonald et al., 2020). Instructional design researchers have been interested in studio learning since at least the latter-part of the twentieth century (Rieber, 2000), in large part because of its reputation for fostering creative

learning collaborations (Cennamo et al., 2011; Clinton & Rieber, 2010). Yet instructional designers have progressed beyond adopting studio approaches in their own teaching to also promoting studio as a way to promote student creativity. Brandt et al. (2013) developed a theoretical framework for the studio as a creative learning community that blends affordances from both professional and academic practices.

Other instructional design scholars have identified structural features of the studio that can be adjusted and optimized for various outcomes, including collaborative outcomes (McDonald, 2018; Rich et al., 2015). Gray and Smith (2016), two researchers who blend their training in instructional design with experience from other fields like graphic design or interior design, have contributed thoughtful critiques of studio learning's more negative aspects. In particular they pointed towards a future where the studio can be structured so as to facilitate creative learning collaborations without the undesirable outcomes (e.g., replicating oppressive disciplinary cultures) that are found in some disciplines.

Designing Creativity Through Awareness of the Audience

Defining *Audience*

The concept of audience in Glăveanu's (2013) 5A framework is intentionally broad. It includes "potential collaborators" in the creative process, such as those found "assisting, contributing, judging, [or] criticizing . . . [people's] creative act and/or resulting artifact(s)." Examples include a member of a creative team, or the client of a creative effort. But the concept also includes those intended to use the outputs of people's creative work, "the wider public that will ultimately receive, adopt, or reject the creation" (p. 74). Our discussion of *audience*, therefore, includes both aspects—how instructional design assists learners in collaborating with those that they work with directly and to collaborate with those for whom they are designing.

Instructional Design Examples

The first type of audience is collaborators that learners encounter directly as part of their creative process or learning endeavor. In this regard, research has shown that the collaborative affordances of social environments in which learning takes place are crucial in fostering creative outcomes. As Beghetto (2016) concluded, students "need an opportunity to share and receive feedback on their new ideas and insights. Doing so helps students test out their ideas, identify strengths and limitations, develop confidence in their ideas, and become aware of how they might further strengthen their understanding" (p. 13). Therefore, educational systems best nurture creativity when they have the affordances to facilitate meaningful collaborations for students between themselves and their teachers (Beghetto & Kaufman, 2014), other students (Sawyer, 2015), and collaborators outside the formal schooling system such as disciplinary experts (Hakkarainen, 2013) or people from dissimilar backgrounds (Leung et al., 2008).

Contemporary instructional design provides many forms of assistance in developing these kinds of collaborative interactions. A common approach is to utilize various educational technologies as affordances that facilitate creative learning collaboration. Of course, technology does not inevitably produce learning outcomes; as Meşe and Sevilen (2021) reminded, employing technology without concern for whether it is being used effectively can actually hinder students' motivation to produce creative outputs (a common refrain in educational technology that is sadly ignored too often; see Reeves & Lin, 2020). But when used well, technology can structure forms of collaboration that contribute towards creative learning outcomes (Tang et al., 2022). In some cases, these outcomes are generated through deeply immersive and cutting-edge technologies like virtual reality (VR; Greenwald et al., 2017) or

augmented reality (AR; Wei et al., 2015), allowing students to collaboratively explore spaces or engage in the joint production of creative outputs.

An illustrative example is found in Yang et al. (2018). In their research, they developed a VR simulation in which students navigated a three-dimensional space to complete a product development task (the primary instruction being to follow a design process to create a wearable, consumer technology). Advantages of the simulation were that the VR environment encouraged students to experiment with new ideas, since the costs of doing so were minimal, as well as it created a pleasing, freeing environment that stimulated students' entering into flow-like states. Yang et al. concluded such simulations functioned as, "a creative support system that could lead to more novel and useful ideas," without the constraints that accompany learning in other environments (p. 1247).

But learning collaborations do not need to be designed around advanced or specialized technology. Even commonplace technologies such as email, file sharing, video conferencing, wikis, social media platforms, and structured discussion forums have affordances that facilitate creative collaborations at a distance (Ekblaw, 2017). This includes consumer technologies that foster workplace collaborations, with examples that are current at the time of this publication including Miro (digital whiteboard software, <https://miro.com/>), Ideaflip (digital "sticky" notes <https://ideaflip.com/>), or OmniGraffle (diagramming and concept mapping software <https://www.omnigroup.com/omnigraffle>).

Brandao et al. (2021) described a use of Miro in an educational design that is illustrative of the possibilities this class of technology provides. In their study, students used Miro to collaborate in a similar manner as do professionals in creative industries—sketching ideas with other students or communicating with project stakeholders. The digital whiteboards functioned

as initial prototypes of students' design concepts, mimicking the same affordances of collaborations and professional interactions they will encounter in workplace settings, both facilitating their creative collaboration in the moment as well as preparing them for opportunities after their formal schooling. Researchers have found that keys to using commonplace technologies like Miro or others mentioned here include structuring them around realistic problems or other kinds of real-world scenarios, creating strong prompts that appropriately guide students through learning interactions, and allowing enough time for meaningful interactions and collaboration to take place (Corfman & Beck, 2019; Martin & Bolliger, 2018; Robinson et al., 2017).

Implications for Practice

Instructional design researchers have studied strategies that can foster creative learning collaborations regardless of the affordances of technology. In some cases, instructional designers have focused on how educational technologies can be used to apply learning strategies that support creative learning (Garrison & Akyol, 2009; Sarker et al., 2019). Similar examples are found in Shaltry et al. (2013), who studied how social technologies (including social media) can enable learning communities that foster creative outcomes, and Liu et al. (2019), who studied how to apply digital technologies towards the end of students' collaborative storytelling.

Further, instructional design scholars have studied how to design rich environments "that have structural affordances that encourage creative expression," meaning the learning designs deeply integrate creative expressions as inherent features of interactions between participants, as opposed to "creativity [being] 'taught' as an isolated outcome" (McDonald et al., 2020, p. 383). Examples include research into the flipped classroom as a means of fostering creative interactions (Al-Zahrani, 2015), developing creative collaboration skills through group writing of

computer programs (Romero et al., 2017), learning group problem solving skills through educational robotics (Socratous & Ioannou, 2022), and, as mentioned earlier, studio-based learning (Brandt et al., 2013; McDonald, 2018).

Of course, many of the preceding examples also apply when considering how learners interact with “the wider public that will ultimately receive, adopt, or reject the creation” (Glăveanu, 2013, p. 74). Zundel et al. (2022) provided a suggestive example, integrating many of the approaches described throughout this section. They described an interdisciplinary product design course that integrated graduate students with undergraduates to create an educational product for local organizations. Common workplace technologies like Trello (<https://trello.com/>) were used to facilitate students’ work, blurring the lines between their learning of domain knowledge about how to apply the principles of creativity with authentic product development assignments. Instructional design strategies such as model-centered instruction (Gibbons, 2001) were used to structure in-class and out-of-class experiences focused on helping students learn expert creative practices. By teaching the *affordances* of these tools and strategies, the learners engage with the *audience* of their product by interacting with other populations directly to understand their educational needs and desires. They used this understanding to create “an actual instructional product” used by those individuals in situations with real stakes, and “in doing so, [students] came to better understand the need for continual empathy, rapid prototyping, testing for feedback, and other parts of the instructional design process.”

Conclusions

Utilizing the lens of Glăveanu (2013)’s 5A framework of creativity, in this chapter we have described how instructional designers can promote learner creativity through the design of formal/informal learning environments. Instructional designers create learning technologies,

systems, curriculum, resources, and opportunities to influence or direct learning. Many times, this is to intentionally achieve specific behavioral or cognitive learning outcomes. However, creativity is, of course, a more complex outcome to achieve because it cannot be forced, and no collection of strategies can reliably produce creativity. However, instructional designers argue that intentional choices can make learner creativity more likely to occur by creating a fertile environment. In this chapter we share a few of those design decisions that have been found to support a holistic creative development. Even though we broke up our discussion around the 5As, many of the examples cited in each section foster creativity across the sections as well, and we believe that designing a fertile learning environment for creativity means considering the interaction between actors, activities, artifacts, audiences, and affordances.

The 5As framework provides instructional designers with a flexible yet structured approach towards designing these fertile, creative learning environments. The 5As remind designers that creativity is a complex, interrelated phenomenon and that isolated strategies are less impactful than holistic designs that synchronize actor, action, artifact, audience, and affordances. More specifically:

- Seeing learners as *Actors*, argues for providing learners agency and ownership of the learning process. This means providing learners choices and open-ended challenges, with failure being seen as being a critical part of the process.
- The emphasis on *Actions* means that instructional designers should focus on process over final outcomes, through emphasizing experimentation, iteration, and reflection, recognizing that creativity does not often emerge through a linear, canned process.

- A focus on developing *Artifacts* suggests the use of project-based learning where learners (often collaboratively) create tangible artifacts that represent their evolving learning and progress.
- Factoring in the *Audience* means that projects should be authentic in nature and learners should have opportunities for discussion, presentation, and critique from a variety of stakeholders (including but not limited to teachers, peers, and community members). Moreover, recognizing the transactional and situational nature of creativity also requires being open to alternative forms of evaluation of student outputs.
- Finally, in terms of *Affordances*, it is important for instructional designers to thoughtfully and intentionally curate tools, resources, and environments that spark exploration. And provide enough ambiguity that learners can see these artifacts as being “constructed” and hence can be reconstructed or repurposed in creative ways. designers should carefully consider how educational technologies, physical spaces, interdisciplinary connections, and sociocultural contexts can provide affordances that spark creativity.

In considering these suggestions for fostering creative learning, perhaps the most important consideration is to design with humility. Sometimes, a designer may believe their role and talents to be critical to fostering learner creativity. However, it is not usually possible to teach creativity directly, and trying to do so may end up counter-productive. Indeed, the 5As framework suggests that instructional design to foster creativity is not as much about “teaching creativity,” as it is about designing environments where it can flourish. The goal of instructional designers, then, is to provide scaffolds when needed but also to let learners explore and play in productive ways with authentic tasks with a variety of tools and technologies. By considering the holistic nature of the learning environment, the designer can be sensitive to the interactions

between the 5As of creativity. In this way, the instructional designer should seek to deeply integrate creativity into the entire learning experience, considering how to use technologies, strategies, practices, spaces, and collaborations to create an environment that fosters learner agency, responds to cultural cues, encourages ambiguity and abstraction, and seeks to create knowledge, rather than deduce it.

This task is challenging; indeed, it requires creativity on the part of the instructional design teams as well (see McDonald et al., 2020). However, designing intentionally to support learner creativity is essential as creativity is, or at least should be considered, one of the most important of all learning objectives.

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