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The Role of Creative Risk Taking and Productive Failure in Education and Technology Futures

Danah Henriksen[1] · Punya Mishra[1] · Edwin Creely[2] · Michael Henderson[2]

Risk-Taking and Failure for Creativity

Creativity is often regarded as a desired and necessary skill (Bloom & Dole, 2018) particularly in the digital spaces we increasingly live and work in. The sudden and often disorienting technological shifts prompted by the COVID-19 pandemic have emphasized this point and highlighted the importance of creative thinking, flexibility, and innovation. It is clear that these attributes are and will continue to be essential components of how we deal with our emerging digital futures. In fact, it can be argued that creativity and digitality are inextricably interwoven as we look to the future of entertainment, education, and work (Cropley, 2020). Preparing ourselves and the next generation requires both the integration of creativity in educational practice as well as the inculcation of creative mindsets in learners (Beghetto, 2017).

At the same time, it must be acknowledged that engaging in the creative process does not necessarily lead to successful solutions. In fact, it is rare that good original, creative work or ideas come together in the first try (Smith & Henriksen, 2016). Thus, an important component of engaging in creative practice is both an acceptance of potential failure as well as a willingness to persist despite these setbacks (Thorley, 2018). This is consistent with a body of research literature that affirms the value of failure and sees it as being an integral and unavoidable aspect of the creative process. Moreover, research on real-world contexts indicates that failure is not necessarily disruptive, but can often lead to productive innovation (Manalo & Kapur, 2018). Noted engineering scholar Henry Petroski (2006) claimed that, "Failures are remarkable. The failures always teach us more than the successes about the design of things" (p. 49). Notions of learning through failure have also become popular across business and industry. Books with titles like "Fail fast, fail often: How losing can help you win" (Babineaux & Krumboltz, 2013), or "Unapologetically ambitious: Take risks, break barriers, and create success on your own terms" (Archambeau, 2020), have been bestsellers. *Harvard Business Review* has published articles titled, "The No. 1 enemy of creativity: Fear of failure" (Sims, 2012). Embracing failure, these scholars argue, is essential to the creative process, either in iterating from it to lead toward ultimate success, or in reflexively recognizing and accepting the challenges of uncertainty and the inherent ambiguity in extrapolating possible outcomes (Swanson & Collins, 2018).

Despite the relatively widespread recognition of these ideas, the idea of the importance of failure for learning in other contexts has not really translated into education, where conservative approaches to schooling, teaching, and learning tend to prevail.

✉ Danah Henriksen
  danah.henriksen@asu.edu

  Punya Mishra
  punya.mishra@asu.edu

  Edwin Creely
  edwin.creely@monash.edu

  Michael Henderson
  michael.henderson@monash.edu

1 Arizona State University, Tempe, AZ, USA

2 Monash University, Melbourne, Australia

Failing at Creative Risk in Education

Educational settings have traditionally had significant hesitancy, even fear, around the idea of failure. Failure often does not fit the desired goal or outcome for students or teachers in most contemporary classrooms (Henriksen et al., 2021). Failure often is seen as being incompatible with gatekeeping practices that steer students towards measurable outcomes. Indeed, references to "failure" within education invariably hold negative attributions and rarely position failure as pivotal to creativity or opportunities for learning.

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Popular rhetoric on creativity in education has also often failed to account for this link between creativity and failure (Harris & de Bruin, 2018); this is despite knowing that engaging with failure is necessary for success, and reluctance to include failure in learning may undermine the capacity of students to be creative (Smith, 2020). On the basis of a small but growing body of scholarly work it is clear that the affirmation of failure as a pedagogical principle is important for fostering creativity in classrooms, to prepare students for the kinds of adaptations and flexibility they need in a global environment of technological change and digital innovation. Nevertheless, research and policy development about the affordances of failure in facilitating creativity within education are much neglected, especially in an educational climate of caution and standardization (Harris, 2016). The notion of 'risk' is often seen as undesirable in teaching and learning because it brings uncertainty in a context where measurable outcomes are an expectation.

Pejorative ideas about failure also abound at the systems level as well, particularly in the context of curricular policy frameworks. Policy settings tuned to standardization and metrics tend to promote risk aversion, through a pursuit of narrow assessment conventions and single-correct-answer approaches (Creely et al., 2019; Hartlaub & Schneider, 2012). This is problematic, considering the importance of failure in the real world as being key to innovation and productive success. In fact, Rich (1991) suggests that "Schools are haunted by failure. Failure haunts the hallways, grounds, and classrooms; it insinuates itself into the lives of the school's inhabitants" (Rich, p.4). Rich points to a school climate and policy setting in which failure is a problem to be solved, rather than an intrinsic part of learning. In the nearly 30 years since he wrote, little is still understood or accepted about how to allow the rich possibilities of failure and creativity to sit comfortably within classrooms.

The Potential of Technology for Learning from Failure

A possible new and emergent space to think about failure in learning involves digital learning environments. We contend that it is critical to allow teachers and students space to experience creative risk taking and productive failure—and to account for these pedagogical ideas in the design of digital or technology-enhanced learning environments. Digital technologies can have a central part to play in enacting creativity, risk, and failure in the messy spaces of classroom implementation (Craft, 2010). The affordances of many digital or internet technologies can create learning spaces in which students can safely fail, learn from failure and iterate towards success.

With emerging possibilities for creative doing and thinking, digital technologies may allow new modalities for dealing productively with failure—assuaging concerns about failure in outcome-driven systems. Technologies such as online digital tools offer ways of enhancing adaptability and independent thinking skills, promoting novelty and opportunities to trial ideas safely—foregrounding personal traits and contextual components established by existing research as correlates of creative thinking (Casimaty & Henderson, 2016). New and emerging digital environments driven by artificial intelligence offer the possibility of nuancing virtual spaces for creative risk-taking and productive failure (Aoun, 2017; Kapur & Gysi, 2017).

Productive failure can be essential for creative process skills and equipping students with an entrepreneurial mindset because it reinforces the idea that creative outputs are rarely useful in the first iteration (Kapur, 2015). Digital technologies can support this pedagogical orientation and offer substantial possibilities in allowing failure to be contained and managed within the limitations of standardized systems in which teachers work and students learn. Failure need not be feared, avoided or dismissed—but can be seen as generative when supported by learning goals that account for the centrality of creative processes in learning, and when mediated through digital technologies that allow for trialling of ideas, new connections to experiences and places, and digital tools that allow for making and thinking in new modalities (Lee & Chen, 2015).

Instantiating Ideas in a Special Section

Manalo and Kapur (2018) noted a dilemma around the principle of learning from failure—that while there is some notion of agreement that failure can be productive for learning, there is no clear sense of how to achieve or harness this, especially in educational contexts where there may be barriers to embracing failure as a pedagogical principle in learning. The authors state:

> The biggest hurdle is that, although we are not short on intuitive and common sense advice about benefiting from failure, there really is a dearth of methods and guidelines (especially ones supported by research evidence) about how exactly this can be done…We do not sufficiently understand the factors that influence or the mechanisms that determine differing outcomes (p. 2).

This dearth of practical specific information, usable practices, and appropriate methods is particularly pertinent when it comes to the use of technologies to support creative risk and failure in learning. This special section, devoted to creative risk and failure through technology in education, seeks to expand this conversation by providing examples, theoretical frameworks, and ideas for future research in this area.

Thus, this section consists of a set of diverse, thought-provoking articles which highlight both empirical and conceptual scholarship, related to educational practice. Despite the diversity of perspectives and approaches, each article here explores and investigates the role of technology in facilitating failure and risk in learning environments to enhance creativity and promote active learning. The seven articles in this reflect a variety of research paradigms, conceptual frameworks, and methods related to this topic.

The first piece in this special section, by Beghetto, engages with the broader issues with regard to the role of digital technologies in supporting creativity as well as the productive value of failure. Specifically, the article focuses on how technologies might be used by teachers and students for creative learning through a positive reframing of failure. The article contextualises this discussion with reference to a curriculum initiative titled, *My Favorite Failure*, in which failure is recast through digitally supported narratives about failure that highlight its importance in creative learning.

Powers and Moore offer a more precise focus, that of game-based instruction in their review of the literature to discuss how failure state mechanics may have considerable promise in meeting specific instructional goals during game-based instructional interventions. Perhaps most notable in their findings is the delicate relationship between perceived risk of failure relative to instructional utility. They define this relationship with a new term, unit of failure, which aims to assist practitioners in operationalizing the use of failure and loss in game-based instructional interventions.

Scharber, Peterson, Baskin, Cabeen, Gustafson, and Alberts contextualize their work within a seven-year partnership between a school district and university. They describe a series of design case-studies undertaken by the partners on the topic of technology integration, and through that explore the connections between technology, teacher learning, creative risk taking, and failure. This practice-centered research offers a rare opportunity to observe the integration and evolution of technology integration over time. Their work notes the importance of designing "context-sensitive" professional development acknowledging and addressing the atmosphere of the school setting, engaging "safe risk-taking practices" in professional development with teacher choice and proximity to professional practice, and "failing together" via collaborative approaches to educational technology professional development.

This focus on K12 practitioners is expanded upon by Arrington, Moore, and Bagdy, through describing a collective case study on how K12 practitioners perceive the interaction of systems thinking, creativity, and learning from failure within their professional practice. They describe their work with graduate students (who were K12 teachers/leaders/practitioners) within an instructional design and technology graduate program that included a course on human performance improvement (HPI). Sharing takeaway reflections, they note the conceptualizations that practitioners have regarding creativity, failure and systems thinking, and the relationship between the three constructs (with different perspectives from teachers and administrators and different levels of consistency in the conceptualizations of each construct).

Stefaniak focuses on the challenges faced by a particular set of stakeholders, namely instructional design students in inculcating a creative design mindset. In particular she notes that despite a call to employ design thinking as a means to foster creativity in problem-solving, many instructional designers struggle with enacting creative risk. For instructional design students to become comfortable with taking a creative risk in design practices, creative thinking must be viewed as a developed habit of mind. Stefaniak offers a conceptual framework to support the promotion of creative risk in instructional design pedagogy. The framework has three key constructs: ideation, dynamic decision-making, and failure-based learning. The more comfortable instructional design students become with engaging in ideation, dynamic decision-making and failure-based pedagogy the better they will be to design solutions that address the needs of their clients.

The article by Smith and Rodriguez brings attention to the important issue of dealing with ambiguity in learning spaces that have a strong focus on creativity and risk-taking and more open-ended approaches to learning. The writers frame this emphasis through their discussion of a hands-on maker learning environment designed for in-service teacher professional learning. They describe and analyze a case study of two teachers who participated in a 15-week course on maker-centered learning. They identify the levels of tolerance of ambiguity experienced by the two teachers, positioning their teacher participants as both students and educators. At the end of the article, Smith and Rodriguez offer significant implications for practice contexts and for research.

Bookending the set is an article by Mills and Watson which offers a conceptual discussion that unpacks the important question of why schools and classrooms have not traditionally supported and encouraged creativity. A key factor, they argue, is the lack of psychological safety within the social system of education that would allow educators to incorporate creative risk-taking in their teaching. They identify a range of systemic barriers within education (such as outdated institutional norms, and an overreliance on high stakes testing) as prevent the incorporation of creativity. Furthermore, they also address the kinds of beliefs and mindsets teachers have about teaching and learning that can prevent them from fully encouraging creative risk taking. They suggest that creative pathmaking requires an iterative approach that recognizes the social constructivist contexts of creativity. In particular, they point to the role that mobile-technologies can play to support and reward risk and productive failure.

Conclusion

Manalo and Kapur (2018) point to a quote of John Dewey's, stating that "failure is instructive," and explaining, "a person who really thinks should be able to learn as much from experiences of failure as from experiences of success" (p.1). The idea that failure is essential to creativity is well recognized. For example, Dewett (2007) points to intellectual risk-taking and a willingness to fail as core elements of creativity. Likewise, Harford (2011) focused on the concept of adaptability in any creative processes that yield something unique and valuable, emphasizing that individuals and groups need to embrace a willingness to risk failure. But these important concepts require more attention in educational research and instantiation in practice, particularly given the realities and changes wrought by emerging online learning platforms and the centrality of digital life in education and broader society.

Without substantive learning experiences that include creative risk taking and failure, students will be limited in their thinking, acting, doing, and making in an era of change that requires creativity and innovation. Educational systems must become places that support the creative development of young people to balance the tendency towards compliance and conformity. By recognizing and allowing failure as part of opportunities to learn, iterate and create, educators can begin to imagine spaces where risk-taking is normalized and creativity is practiced intentionally. It is our goal that this special section of the journal is a step toward leveraging this conversation in educational research and practice.

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