



## Creativity and risk-taking in teaching and learning settings: Insights from six international narratives



Danah Henriksen<sup>a,\*</sup>, Michael Henderson<sup>b</sup>, Edwin Creely<sup>b</sup>, Ana Amélia Carvalho<sup>c</sup>,  
Miroslava Cernochova<sup>d</sup>, Deepshikha Dash<sup>e</sup>, Trina Davis<sup>f</sup>, Punya Mishra<sup>a</sup>

<sup>a</sup> Arizona State University, U.S

<sup>b</sup> Monash University, Australia

<sup>c</sup> University of Coimbra, Portugal

<sup>d</sup> Charles University, Czech Republic

<sup>e</sup> Indian Institute of Technology Kharagpur, India

<sup>f</sup> Texas A&M University, U.S.

### 1. Introduction

Creativity is a highly sought-after capacity in many learning discourses (Craft, 2010; Dwyer et al., 2014). It is often positioned as vital to education futures, given the complex problems and settings that students face. However, an often-ignored aspect of educational creativity is its connection to risk-taking (Harris & de Bruin, 2018). Risk-taking, enacted through a willingness to try new ideas and possibilities, and engage with the potential for failure, is key to the iterative nature of creativity and learning (Beghetto, 2018).

Much existing creativity research has noted that creative people demonstrate an openness to experience (Harris, 2004), even when there is a potential for uncertain outcomes or failure. Creative risk-taking is not about dangerous or risky behavior, but an orientation to the new and to learning through mistakes or challenges (Balkin, 1990). A small but growing base of literature has focused on factors that support or inhibit creative risk in teaching and learning (Henriksen et al., 2018).

The intersection of creativity and risk-taking is important for the present and future of education. The sudden and disorienting technological-remote shifts of the COVID-19 pandemic have demonstrated how important innovation is to educational practice in the midst of change. This points to a need for practice stories from educators who are open to new ideas, creative risks, and a willingness to embrace novelty (even with uncertain outcomes), in pursuit of solutions for students and communities. That said, risk-taking and creativity are inherently tied to fear and failure—because of the potential for new initiatives to go wrong. These interconnected elements of risk and failure are not easily addressed by most education systems. Globally, educational contexts are often driven by caution and standardization, where risk or trialing does not fit desired goals, narratives or outcomes, given the emphasis placed on productivity and test scores (Beghetto, 2018). Harris and de

Bruin (2018) emphasize the need for research to consider how creative risk-taking can be incorporated into learning settings. In this paper, we aim to support this call for more exploration of creative risk-taking in education contexts and through the narratives of educators *in situ*.

The authors of this paper were members of a working group on creativity at EDUsummIT 2019. In this UNESCO-based global gathering of education leaders and researchers, we collected real-world practice narratives from international group members (the authors of this paper), exemplifying creative risk in teaching and learning practice settings. We begin by reviewing the literature on creativity, risk-taking and failure. We then describe our narrative inquiry-based research approach and present the six international vignettes where creative risk and failure were instantiated. Following this, we discuss key themes and takeaways based on the narratives, with implications for research and practice.

### 2. Risk-taking in Creative Learning and the Potential for Failure

In a world characterized by change and complexity, today's students face an unpredictable future. Being able to think creatively and adapt to change is essential for teachers and learners in creative problem solving and innovation (Brown, 2009).

Most research defines creativity as both a process and set of capacities to devise ideas, create solutions, produce artifacts that are relatively novel and effective (Runco & Jaeger, 2012). Risk-taking is essential to most conceptualizations of creativity (Dewett, 2007); and risk is unavoidable in creative learning given the potential (and inevitable fear) of failure. Creative endeavors also touch on social risk because of the potential embarrassment or discomfort with sharing ideas publicly, especially if there are possible negative outcomes (Beghetto & Kaufman, 2007).

\* Corresponding author.

E-mail addresses: [danah.henriksen@asu.edu](mailto:danah.henriksen@asu.edu) (D. Henriksen), [michael.henderson@monash.edu](mailto:michael.henderson@monash.edu) (M. Henderson), [edwin.creely@monash.edu](mailto:edwin.creely@monash.edu) (E. Creely), [anaameliac@fpece.uc.pt](mailto:anaameliac@fpece.uc.pt) (A.A. Carvalho), [miroslava.cernochova@pdf.cuni.cz](mailto:miroslava.cernochova@pdf.cuni.cz) (M. Cernochova), [trinadavis@tamuc.edu](mailto:trinadavis@tamuc.edu) (T. Davis), [punya.mishra@asu.edu](mailto:punya.mishra@asu.edu) (P. Mishra).

Despite the prevalence of risk-taking in creative development, risk is often viewed negatively in schooling. Policy settings tuned to standardization and metrics promote narrow norms and one-correct-answer approaches (Creely et al., 2019). School environments, driven by policy and assessment framings, often approach failure punitively (Hartlaub & Schneider, 2012). This can suppress creative risk-taking and openness to new ideas; and the stories of those who do engage with risk and failure may not be heard. Yet, people often learn more when they fail and confront a problem, then regroup and reflect, than they do if they sail through an activity without struggle. Petroski (2006) noted, “Failures are remarkable. The failures always teach us more than the successes” (p. 49). Manalo and Kapur (2018) assert that schools should account for the design of learning environments that recognize creative risk and allow for productive failure, pointing to the utility of narratives that foster these ideas.

Kapur (2015) coined the term ‘productive failure’ to describe an approach to learning through failure, in the classroom. Such a process may lead to failures along the way, which are designed to also support important reflective learning (Bolander Laksov & McGrath, 2020.) However, it has greatest efficacy with appropriate forms of instructional intervention, specifically those that allow for guided reflection on risk-taking and formative failures couched in a careful learning design—not haphazard or unreflective failure (Kapur, 2015).

To allow for elements of creative risk, educators make decisions about the design of the activities. This might include designing learning sequencing and creating a climate that allows for risk, experimentation, failure, and iteration (Koh et al., 2015)—or devising contexts that utilize complex problems that challenge but do not frustrate, use prior knowledge, and allow for multiple representations/solutions, with opportunities for students to explain and elaborate. Learning requires space for reflection on elements of risk, failure and challenge including summative *nonjudgmental* reflection on all outcomes (Kapur, 2015).

Creative confidence can be hampered by pejorative views of risk or failed outcomes. Thus, more attention is needed in developing mindsets for creative risk and allowing the potential for failure both in teachers and students. In this article, we enter the circumstances of teachers and learners on the ground—through real-life narrative vignettes, and narrative inquiry methods—to elucidate the role of teachers in supporting creative risk-taking with potential for failure.

While most creativity literature notes the importance of risk-taking, there is little research to explore this in schools from the point of view of educators. The risk-averse nature of schooling has left a dearth of research on how teachers and learners might operate in these uncertain spaces (Manalo & Kapur, 2018). Narratives from the coalface of teaching and learning are pivotal to understanding the instantiation of risk-taking in practice—thus, we explore practice stories through the methodology of narrative inquiry (Brandell & Varkas, 2001).

### 3. Methods

This paper reports on six curated stories of creative risk-taking and productive failure that are summative in style. Methodologically, we use a narrative inquiry approach to understand these stories (Brandell & Varkas, 2001). This approach promises an opportunity to gather insights about diverse practice contexts, which can support and guide future empirical research (Merkens, 2004). Therefore, we drew the narratives in this study from diverse international contexts aligned with the exploratory goal of revealing the role of teachers in supporting creative risk-taking and the potential for failure in learning challenges.

We acknowledge international differences in policy and curriculum framings around notions of creativity and risk-taking (Henriksen et al., 2018). However, there are also insights in looking across sectors, from primary school through to tertiary teacher education (Henig et al., 2016). In keeping with Burns’ (1997) approach to purposive sampling, we worked with the group to have each member develop a vignette from their own international context. For the research, each author con-

tributed their story (the EDUsummIT working group leaders organized the study and writing but did not use their stories in this paper to avoid overrepresentation of certain nations). The six narratives from international academics describe their research with teachers, taken from five different nations and spanning primary, secondary and tertiary settings. The authors of the practice stories have a dual role as researchers and sometimes participants—as reporters of practice and research collaborators. The emphasis is strongly about reflection on the practice experiences of teachers.

#### 4.1. Context for the study

This study emerged through the efforts of a working group at EDUsummIT 2019. EDUsummIT is a global consortium of researchers, leaders and policy makers, which is driven and supported by The United Nations Educational, Scientific and Cultural Organization (UNESCO).

Every other year, this global community of researchers, policy-makers and practitioners convenes in a different international location. The participants collaborate in working groups focused on supporting the effective integration of technology and pedagogy in education by promoting active dissemination and use of research. The authors of this paper were all members of the 2019 working group centered on creativity. The creativity-focused group had ten members, and a subset of those collaborated for this paper. We worked virtually prior to coming together to collaborate for several days at the bi-annual EDUsummIT convening in 2019 in Quebec City; and we followed up the convening with ongoing work on this study. Our work aimed to understand the nature of creativity in teaching, via one of its key components of risk-taking practices. This called for a need to better understand the construct through narratives of practice, and then explore these to extract common takeaways. Manalo and Kapur (2018) emphasize the need for narratives that explore creative failure and risk, and the unique international setting of EDUsummIT allowed for the bringing together of such narratives among diverse education professionals.

#### 4.2. Research Approach

Through exploring such practice stories, and purposefully reflecting on their meanings, there are opportunities to identify connections between research, policy and experiences in teaching and learning (Byrne, 2017). Using narrative inquiry as a conceptual and methodological approach to research, we aim to understand the grounded experiences of educators (Clandinin, 2015; Hendry, 2009). Narrative inquiry is a way of investigating experience through purposive storying in community, in line with social constructivist notions of knowing (Clandinin & Connelly, 2000; Corden, 2001; Kukla, 2000). Narrative inquiry contains three elements that circumscribe the narrative: temporality (located in a defined time), sociality (located in a social and cultural group or circumstance), and place (located in a spatial setting). The stories contain both the immediacy of the experiences (what happened) and abstractions, reflections and interpretations beyond the experiences (what is significant) (Connelly & Clandinin, 1990). In this research, juxtaposing six discrete stories with different contexts allowed useful comparison across themes.

Given article length constraints, the stories from the six contexts were circumscribed. They were developed as crafted vignettes that evolved over three phases. Phase 1 involved the initial selection of an example from each person’s experience, generation of a narrative focus and structuring of each story. The two lead authors prepared a literature review of creative risk-taking to align the authors’ narratives around common themes and concerns, despite the different educational contexts and sectors. All of the authors fashioned structured stories of open-ended, creative risk-taking in educational settings that they had studied wherein there was potential for failure (drawn from their experience) using a template with prompts designed to bring attention to key issues and example details and to expedite the process. Authors worked

on this on their own, prior to the EDUsummIT 2019 convening. The narrative template included the following categories:

- 1 contextual details (participants, setting, etc.);
- 2 description of the learning activity; description of the nature of the risk-taking/failure;
- 3 the role and actions of the teacher;
- 4 the role of tools or technology;
- 5 and a statement of the broader national and curriculum contexts related to creativity.

This template helped to generate and contain the narratives for thematic investigation.

Phase 2 focused on refining the stories towards a synthesis. The authors came together for a three-day workshop as part of a creativity working group at EDUsummIT 2019. Over three days the authors engaged in sessions for story refinement—for the purposeful and cohesive structuring of the narratives. The authors first presented their structured stories to the group and, where necessary, added further details as a result of feedback. Over several sessions we worked to refine (a) the nature of risk-taking and potential for failure, (b) what supported the risk-taking, (c) what frustrated or constrained risk-taking, (d) the role of teachers, peers, family/caregivers, and others, (e) and the role of tools or technologies.

Through these sessions the authors worked in pairs and small groups as a form of inter-coder reliability to identify common threads between the narratives and to facilitate collaborative narrative making (Saletta et al., 2020). All authors then reviewed and discussed the extracted information from across the practice narratives in checking for conceptual validity and cross-case thematic connections.

Phase 3 involved a post-workshop session where the authors finalized their accounts, employing the structured narrative template and workshop collaborations as part of their processes to prepare their prose. The lead authors then edited the stories for inclusion in this paper and conducted a thematic coding to identify salient takeaways for discussion (Merkens, 2004). The narrative exemplars offer the opportunity to hear the voices of practitioners on the ground, with themes across disciplinary areas and educational sectors.

Phases 2 and 3 point to the highly dialogic nature of this research event, in which academics from many countries came together. Building on conceptualizations from Bakhtin (Holquist, 2002)—that ‘self’, language use, and meanings are generated out of dialogue and interactions—we suggest that the narrative vignettes were an outcome of our comprehensive dialogic processes at EDUsummIT 2019.

#### 4.3. Limitations

There are limitations in this work, such as the small sample size and the lack of comprehensive global representation (given the purposive sample of creativity working group members of EDUsummIT). Given the nature of the EDUsummIT context and the way this work evolved dialogically within a small working group drawn together by similar interests in creativity, there is the potential for bias, per most traditional empirical research paradigms. There is also the potential that given each group member’s interest in the topic of creativity, these stories may take a more affirmative tone to the ideas of risk and failure than other educators might.

To ensure qualitative trustworthiness, there is a need for clarity about researcher positionality (Anfara, Brown, & Mangione, 2002), and thus we have acknowledged the dual nature of our researcher-practitioner roles. Narrative inquiry approaches acknowledge and allow for a researcher’s positionality within the stories and analysis of their work, and subjectivity is expected and recognized (Clandinin, 2015). Generalizability or perfectly unbiased findings is neither a goal nor a possibility. Instead, such narrative approaches take a practical orientation to capturing real lives, stories, or examples as lived outcomes—with

the goal of connecting understandings to the everyday world. The qualitative principle of ‘transferability’ is possible, in which the audience for the research is tasked to decide (based on the details provided for each story, information, or context) what ideas or principles may transfer into other settings (Slevin & Sines, 1999). Toward this end, we have included a table (Appendix A), which summarizes demographic details and other background information, to supplement the narratives that follow.

### 5. Researcher narratives about teachers and creative risk-taking and productive failure

#### 5.1. Vignette 1 - USA - school wide systems level - Designing a new cross-curricular frame

This story is grounded in an ongoing professional/curriculum development partnership between a college of teacher education and teachers in a rural 7–8 grade school in a mining town in the American Southwest. The goal for this project was to get the teachers to develop an entirely new curricular frame to allow students to engage deeply with ideas and to see connections across curricular subjects. 5–8 teachers participated in these design exercises working with design strategists from the teacher’s college. The design strategists aimed to foster an intentional, collaborative, open-ended, iterative design process that gives control of change and innovation to educators. The emphasis was on valuing action guided by empathy, diverse perspectives and experimentation and thus the possibility of failure.

The design team worked with the teachers to completely redesign the 7<sup>th</sup> and 8<sup>th</sup> grade curriculum through an integrated historical lens so that students could see connections between the different disciplines through the day. The teachers decided to focus on the time period from the beginning of the first World War to the end of the second. The challenge for the teachers was to create activities and lessons for their particular subject areas (from language arts to STEM, from journalism to music) that would connect with that time in history.

A critical risk that the teachers spoke of was the potential for things to go even more wrong for the students, particularly in their test scores. Each school in Arizona receives an AZ-Merit score and can be given a “failing” grade. This means that teaching to the test becomes the single biggest factor in a teacher’s mind and planning. Another teacher risk was that the project required them to step out of their comfort zone, and enter into each other’s expertise to find spaces to collaborate on the curriculum, potentially putting their relationships with each other at risk. They were also sensitive to their own lack of knowledge of other disciplines.

Multiple factors led to a productive outcome. First, was the support of the school principal. Second, the design sessions allowed the teachers to try and test their ideas, to collaborate and connect with each other around a shared project. Third, was a sense that if they continued the way they had been working previously, it would continue to alienate students. Finally, the design team created “safe” spaces to engage, interact, plan, strategize and prototype ideas without having to commit to them, thus giving teachers time to play and connect.

#### 5.2. Vignette 2 - Australia - Year 8 mathematics creative problem solving

This story is based on a small research project conducted with secondary teachers and educational leaders in a private school in Melbourne, Australia. Seven experienced teachers of Year 8 students, together with two educational leaders, participated in the project exploring the use of creative risk and productive failure.

To begin, the research team ran a whole-day masterclass with the teachers and the school principal, focused on creativity, risk-taking, and productive failure. Over the subsequent month, teachers worked with the ideas of risk-taking and productive failure and documented their experiences in an online journal. They then participated in a fo-

cus group and interviews. This example is the experience of one of the teachers—Leah (pseudonym).

Leah's math activity focused on a universal rule about the total degrees of the interior angles of any triangle. Instead of giving the students the rule (outlined in their textbook), she asked them to work it out for themselves by creative experimentation and trial-and-error. While the activity had one ostensible solution (the internal angle rule) there were multiple solutions paths and knowledge representations that pairs worked through. Students in pairs drew different types of triangles on large sheets of paper, and then worked out the rule by measuring the angles of the different triangles with a protractor.

Leah asked students to use a think-aloud protocol to work out answers and support each other. Some students were quickly successful, but many became highly anxious, stuck and wanted the textbook answer. Students who became stuck were asked to backtrack and redo the process of discovery. By iterating through the process, most students were able to effectively complete the task. From there, the teacher led the class in a collective process reflection to enhance awareness of how mathematical concepts are formulated and how using failure can facilitate this formulation.

In the interview, Leah explained that many students relied on her and were reluctant to get the answer wrong. She observed that the students benefited from getting stuck and working collaboratively and iteratively to solve the problem. Leah intentionally planned the activity to create some discomfort but did not prepare students for it; it was essentially dropped into the class. She did not expect the anxiety this caused for some students, many of whom vocally complained. She had to work with students to prompt and reassure them that this was part of the work of mathematics.

Risk and failure are generally framed negatively in Australian curriculum frameworks, and this is reflected in classroom practices. This may have accounted for the fact that Leah had not built a prior classroom culture where students were comfortable with risk and failure, leading to greater anxiety. These concepts are generally not accepted in curriculum because they appear to run counter to fear of failure driven by rigid summative assessment practices. Moreover, this was in a private school, and throughout the study the teachers noted a keen need to avoid unfavorable parental opinions.

### 5.3. Vignette 3 - Portugal - undergraduate teams creating an Escape Room/Treasure Hunt

This story is based on a project with undergraduate students enrolled in a 1<sup>st</sup> year Education Sciences Degree, at the University of Coimbra, in Portugal. The students were challenged to a group task that required designing either an Escape Room, or alternatively, a Treasure Hunt.

To perform the work, the students were asked to use different types of information related technologies such as QR Codes, online quizzes, augmented reality, GPS coordinates, among many others. Creating a narrative for their project was important, particularly in the Escape Room, as the story is what engages and contextualizes participants.

The group work demanded a conceptual understanding of the content as well as creative risk-taking in terms of using new and unfamiliar technologies and pushing learners to represent knowledge in novel ways. The students were used to reading scholarly papers or books and writing essays, so this open-ended, project-based group work (with no one clear solution) was outside of their comfort zone. Most of the groups had a difficult time finding ways to represent their knowledge as challenges, that is, as executable but higher-order thinking tasks.

In supporting student risk-taking, the teachers provided weekly tasks to develop student comfort and skill in exploring multiple approaches. The teachers also used Google Forms as a mechanism to collect weekly feedback about students' group progress. When the students struggled, the teacher encouraged and prompted each group to reflect on their failure and to identify lessons learned. Each group was also encouraged to try out different ideas and different technologies to create a more

challenging Escape Room or Treasure Hunt. The technology allowed new forms of creativity through allowing different representations of knowledge, and it supported the feedback processes between groups and the teacher. Only one group out of eighteen did not finish their group work.

### 5.4. Vignette 4 - Czech Republic - primary school students' creative storytelling through programming and robotics

This story is based on a creative design activity conducted with children during a five-day summer camp in Prague in the Czech Republic. One Information and Communication Technology (ICT) teacher and two Primary Education student teachers managed the creative storytelling project for 20 pupils (aged from 8–13 years) from different elementary schools in Prague and its outskirts.

The children spent the first four days programming (in Scratch), robotics (with ozobots, WeDo, etc.) and other activities with digital technologies. For four days, they were divided by age into two groups A and B. On the fifth day the children were organised into new mixed-aged groups to work on a storytelling activity.

For the technology teacher and two assistants who had known the children only for four days, the storytelling activity was a great pedagogical risk. Before the activity, the children had no experience with Bee-bots or collaborative teamwork. They were expected to be able to: (1) collaborate and cooperate; (2) determine the central idea of their story for Bee-bots; (3) manage their work in groups (someone drawing pictures/creating figures, another programming, etc.); (4) develop the detailed story components; (5) learn to program Bee-bots; (6) arrange the story and debug the program; (7) present the story to summer camp participants. Each of these points was a source of potential failure for the children's creativity and their group story. The teacher and two assistants observed the work of each group, intervening by helping to identify with them why they were failing in the project (poor work organisation, insufficient cooperation, insufficient control of the Bee-bot program, etc.) with the aim of turning children's failures into understanding why they were not successful and that, at any age, error-making plays an important role in learning.

The primary factors that challenged the outcome included lack of cooperation from some group members, or overly complicated story design. The technology posed a risk if the children had made errors in programming the Bee-bots, but it also allowed for trialing and iteration. Importantly, success came for the groups that embraced new ideas, did not fixate on single goals, and continuously worked through iterations of trial and error involving debugging the program to ensure it corresponded to their story. Subjects such as computer science, programming and robotics are opportunities to show children how important it is to fine-tune their work, to iterate, make changes, verify that everything is working as it should—to discover mistakes and not to fear them.

### 5.5. Vignette 5 - India - secondary school English as a Foreign Language (EFL)

This story involves 300 students and 20 teachers in 8th and 9th grade from 5 rural schools in West Bengal, India. The schools were taught in the local language, Bangla, but English was taught as a second language, because global tests across subjects such as Science and Mathematics are in English. Students, however, lacked confidence and self-esteem in English.

This project involved working collaboratively with teachers who were charged with designing a new curriculum with dual goals of making connections across Science and Mathematics while supporting their meaning-making in English. The work was done through an intentional, collaborative, open-ended design process that values creativity in education. Teachers worked in two groups. One group of 10 teachers was responsible for the design of the science curriculum and the remaining 10 were responsible for the mathematics curriculum. These design

teams were diverse, consisting of both language teachers and content subject teachers.

The teachers felt significant risk in taking on a project of this size and scope. One risk emanated from the fear of decreased test scores. Another risk involved teachers relinquishing control over what they had done for a long time and believed was working. In addition, they stepped out of their comfort zone trying something new and challenging with the potential to fail. They were sensitive to their own lack of knowledge, particularly language teachers who now had to connect to the science or mathematics.

The final curriculum design involved working with a range of tools. These included digital tools such as computers or tablets as well as more traditional tools such as paper, pens and protractors. Once implemented, it was clear that the most successful students were those that did extensive trial-and-error work with a range of topics.

On reflection, the teachers appreciated that the students had to think, get stuck, and work collaboratively to solve problems they encountered. A few were surprised by the anxiety and mental stress that the work caused for some students. They worked to assure students that the use of a second language was part of their mathematics and science learning. Risk and failure are framed negatively in Indian curricula and classroom practices. Being part of an experimental institutional project allowed schoolteachers to try new ideas and allowed for more active creative solution-making and collaboration.

### 5.6. Vignette 6 - USA - 8th grade robotics curriculum design

This story is based on a research project conducted with secondary and junior college faculty. Thirty teachers participated in the program at a large, public university in central Texas. The program provided an opportunity for teachers across various disciplines (mathematics, computer science, career and technical education, and engineering) to gain knowledge and insights about engineering research, and more specifically cybersecurity.

During the first half of the six-week program the teachers engaged in various professional learning sessions (e.g., scientific inquiry and engineering design, curriculum design, and disciplinary core ideas). Each week culminated with a full-day session where the education director worked with teachers as they designed their curriculum. Designs were based on the teachers' translations of their research activity and experiences into relevant STEAM lessons or units for their students. Some teachers became stuck at various stages of the design process but found success after a few iterations.

The experiences of one of the teachers, Edward (pseudonym), provides an illustrative example of his immersion in research and curriculum design with instances of productive failure. Edward is an eighth-grade teacher and STEM Coordinator. He developed a problem-based learning (PBL) activity based on his STEM Academy's theme Mission to Mars. Students were tasked with the prompt: "The new rover landed at location A and needs to collect samples and deliver them to location B. This is uncharted territory. Using the Engineering Design Process, design, build and program a rover to travel safely from point A to point B autonomously." The task required students to use a range of technologies including designing and programming an Arduino powered robot for the Mars rover. It was felt that this approach specifically facilitated trial-and-error in the exploration of multiple solutions.

Edward emphasized with his students that engineers follow the engineering design process in developing prototypes to meet the problems or challenges they are faced with. This included documenting the whole process, allowing them to replicate the successes and analyze failures. To support this goal, Edward asked a series of questions to help students reflect and productively learn from the successes and failures.

For some of the teachers, engaging in curriculum design based on the translation of research experiences was challenging. Instances of productive failure were entangled throughout the design process. Edward's students were engaged in a learning design constructed to support their

creative risk-taking, problem solving and productive failure; however, his learning design was itself an example of creative risk-taking that involved setbacks and frustrations to learn from. Indeed, it could be concluded that having teachers experience these things in their own learning can be instructive and enhances their ability to integrate similar experiences in learning or curriculum design for their students.

## 6. Discussion

These stories offer a glimpse into the global educational landscape of teachers' work, exploring the challenges faced by teachers and/or their students in engaging with risk and failure. These stories point to the goal of open and creative educational opportunities built on a constructivist model of learning. They reveal key themes that point to areas for further research and suggest where common ground and intersections might lie, internationally. These themes include: the *essential role of design* in supporting creative risk-taking opportunities, the *need for a developed learning/classroom culture for risk-taking* and failure, and the *teacher's role in managing discomfort*. After each of these three core theoretical findings, we offer a short subsection of practical implications for learning.

### 6.1. Learning from design as a discipline

An overt theme and intersection across these narratives is the role of design as part of the learning process. Although none of the group members were prompted to integrate the notion of *design* into their stories, and design was never mentioned in the structuring template—win each narrative, the concept of 'design' emerged strongly and frequently.

This may be because design offers a substantive process and a way of thinking that connects with open-ended and ambiguous problem solving across disciplinary areas (Razzouk & Shute, 2012), and perhaps even across regions with different educational systems. It can offer a flexible sense of structure or task characteristics to creative risk-taking, when addressing unknown, uncertain or open-ended problems, tasks, or settings where risk and failure are present (Henriksen et al., 2018). Of course, design practices do not necessarily reduce risk (as is clear in the stories we offer in this article), but they may help in managing the learning process and dealing with ambiguities and complexities that characterize most learning contexts (Petroski, 2018).

Design is a purposeful process for finding appropriate, creative or useful solutions, and those solutions may take the form of artifacts, processes, strategies, problem solutions, and more (Workmon, 2018). In design work, uncertainty motivates designers toward a resolution through action. Epistemic uncertainty is a mediator between design requirements and the use of strategies to design or create something (Ball et al., 2010). This epistemic uncertainty is seen in Schön's (1984) description of design as part of human-centered problem solving or creative efforts, in situations that involve uncertainty, instability, or uniqueness. Henriksen et al. (2018) suggest that design connects deeply with teaching and learning and is infused in situated practice.

Across our examples explicated in this paper, where the risk-taking or failure was viewed productively, design had an active role. For instance, in both of the U.S. vignettes as well as the India narrative (Vignettes 1, 5, and 6), the teachers were learners themselves, and explicitly used design practices or thinking to help them rethink curricula and learning practices. In these instances it was teachers who were taking risks or trialing ideas that they feared might not work, but they were able to 'design' their way toward new solutions or approaches—which they ultimately saw as beneficial. For example, in the Australian example (Vignette 2), the notion of design did emerge, but it was not positioned as key to the work of the learners. The teacher herself aimed to 'design a teaching activity' that allowed for productive failure—but the experience of learners was around trialing answers through open ended think-aloud strategies. The teacher found the activity to be useful

in challenging students' thinking, but design had a more transformative role in her own teaching practice.

While we have pointed to the common creative risk-taking thread of design thinking, the embodiments of design emerged differently across these six stories of practice. Sometimes more explicit frameworks were used (e.g. the U.S. examples used backwards-design or design thinking frames), and sometimes the learners' tasks were learning-by-design activities, such as advocated by Kafai (1996). Across these stories, a common theme was that learners were asked to create or make something and engage in learning *through* the process of designing something. Notably, when students were learning by design, the role of the teacher was transformed too. Here, the teacher often served as a facilitator in the learning, supporting students through the uncertain cycles of designing toward an end. The narratives in this study, created in the dialogue and collaborations of academics from four continents, point to the efficacy of design approaches in fostering risk-taking in classroom contexts. In constructing our summative narratives together as a research group, the importance of design became a core theoretical basis that emerged early in the process.

### 6.1.1. Implications for learning

To allow for more creative risk-taking, educators may look to incorporate design tasks and creative skills in their pedagogical practices. This could involve developing projects or activities built around the notion of learning about a subject through the actions of designing, making or creating something, such that risk-taking, productive failure and iterative processes are activated and deliberative (Manalo & Kapur, 2018). Teachers might also draw upon published design tools and resources, including frameworks or design procedures that are increasingly available—many of them developed explicitly for education or student learning (e.g. from IDEO or others). As a group of international academics, we do not advocate for any particular design tool or framework. Rather, we point to the universal principles of design, coupled with illustrative examples of practice to help educators consider how they might bring opportunities for creative risk and learning through failure into their situated and culturally specific practices—for students and for themselves.

Design thinking may be an integral approach in classrooms because it allows creative risk and failure in the support of learning. However, there is front-end design work to determine how to make students active learners in using design tasks appropriate to the content (Razzouk & Shute, 2012). In the action of teaching itself, the role of the teacher may shift toward more facilitation of students' learning than just transmission of content given a shift in agency. In this shift, design might offer a bridge between creative risk-taking and the real-world practices of classrooms, transnationally, with awareness of the different ways that teacher agency is seen across regions and sectors. In working out our practice stories as scholars in a multi-vocal and constructivist environment, the differences and the possibilities across jurisdictions, including the intersectionality of agency and creativity, became more tangible.

## 6.2. Creative risk should be supported by classroom culture

The second theme is the importance of the development of a supportive learning culture that embraces risk-taking. The notion of how learning culture allows people to engage risk emerged differently across vignettes. This was important in affecting how people experienced this sense of creative risk and potential for failure.

For instance, in the U.S., risk and failure are generally viewed punitively in the broader educational climate or policies (Henriksen et al., 2018). The Vignette 1 writers noted that despite the teachers' fears or hesitancy, the principal himself as school leader was supportive, and a collaborative design-based professional development facilitated the challenges, leading to an overall positive outcome. Similarly, Vignettes 5 (India) and 6 (U.S.) involved teachers' experiences with taking risks and explicitly allowing the potential for failure in curricula. In these cases, there was initial uncertainty and discomfort in the risks and challenges,

which might be attributed to broader national education policy settings that are unsupportive of risk. Ultimately, the teachers came away feeling more positive than they expected. The collective nature of these endeavors—one which occurred in a rural school collective, and another in a collaborative professional development setting—may have offered additional social and emotional support for the challenges and prospect that outcomes might go wrong. Studies have noted how risk-supportive learning cultures and opportunities for collaborative work can provide a sense of a 'safety net' for people to experiment and be more innovative (Martins & Martins, 2002).

In the Australian narrative example (Vignette 2), a primary feature that the teacher described in the temporality of her teaching was the students' discomfort, struggle or upset through the process. While she felt the activity was worthwhile, she had never prepared students for such an open-ended challenge—it was not part of the larger pedagogical narrative of her classroom. In bringing a learning-through-failure activity into a classroom culture which had never done this (and was somewhat risk-averse), the challenge was magnified, and students resisted. Both the Czech Republic (Vignette 4) and Portugal (Vignette 3) examples are educational narratives where the teachers sought to provision students within the classroom toward this productive failure orientation. Notably, both involved collaborative groups completing design tasks. Since creativity is often considered 'risky' because of the social hazard of failure or individual embarrassment or discomfort in sharing work publicly (Erbas & Bas, 2015), having social partners and collaborators can mitigate this sense of risk and allow more openness. In particular, the writers of Vignette 3 noted how the most successful groups had a group culture that allowed for trialing wherein someone was not afraid to start.

An ethos that supports creative risk can occur at several levels—in groups, classrooms, schools, and beyond. The powerful role of classroom cultures to affect how students behave, think, and learn has been much discussed (Gambrell, 1996). Classroom culture is critical to how teachers help students internalize beliefs, skills or practices—such as creativity (Richardson & Mishra, 2018). Culture drives human life, behavior, and thinking (Brislin, 1993), and helps in the construction of success narratives for teachers and learners. It is important, to note the relevance assigned to school and classroom cultures internationally and cross-culturally in driving how students work, think, and develop their academic identities and agency. The narrative inquiry approach adopted in this paper enabled this common cultural and regional epistemological ground to be identified and understood as we unfolded it in our dialogue.

### 6.2.1. Implications for learning

These stories point to the need for a supportive environment for creative risk-taking, not only for students but for teachers. Although an educator might decide to try a new 'risky' activity or give students opportunities to learn from failure, it may be difficult to get all students to engage if such activities feel like atypical moments in an otherwise predictable classroom focused on expected outcomes. Much organizational research on creativity has noted that to get people to innovate, try new approaches or risk failure, they need regular opportunities to do so without fear of retribution if things do not go well (Martins & Martins, 2002). In short, occasional attention to creativity and risk-taking is unlikely to unfreeze students' thinking or behavior. Such learning characteristics should be woven directly into curricula and designs for learning.

Considerations of risk-taking and productive failure in education should include factors such as:

- 1 The discourse used to frame risk and failure in the cultural context;
- 2 the reward/punishment systems about trying something new or risk-taking in learning;
- 3 the design of learning activities towards more open-ended/project-based work and collaborative opportunities that focus on solution making;

- 4 the learning climate of the classroom, where students are encouraged to support each other's attempts at novelty and experimentation, even when they are unusual or unsuccessful;
- 5 and the regional and cultural school and classroom narratives about what counts as success in learning.

Teachers should be supported by administrators in considering these factors. Giving teachers opportunities to collaborate in a safe professional environment where they can take risks, share fears and uncertainties, and learn from failures, is essential to creating a positive professional culture. [Vedder-Weiss et al. \(2018\)](#) specifically suggest that regular professional development opportunities, inter-regionally and cross-nationally, where teachers are encouraged to share failures with each other, and to destigmatize, debrief, learn from and support each other, is imperative for creative professional learning environments. Further, they note the social and emotional tensions in creative risk-taking and approaching pedagogical failures, as well as the need to “develop awareness and understanding of framing and acknowledge the related socio-emotional challenges” (p.40). Our narrative and dialogic work affirms this need to position creativity and risk at the heart of learning, rather than peripherally.

### 6.3. The role of the teacher in managing discomfort

The final theme in these narratives revolves around the role of the teachers and educational leaders in managing discomfort related to change and new ways of learning. Teachers are often in the role of providing social-emotional support to their learners. A key difference in these six stories was in the type of support teachers/leaders focused on in more open-ended activities that were less-bounded and more risky. In this sense, we found that teachers often conceive themselves both facilitating the learning and also helping to mitigate anxieties about the uncertainty or fears of failure.

Vignettes 2, 3 and 4 directly involved student learning through open-ended risk-taking with potential for failure, and each differentially showcased how teachers helped assure or support students through the process. The Australian case (Vignette 2) specifically notes that students felt uncomfortable or unprepared for the tentative nature of the task and were highly anxious, complained or relied on the teacher or sought the textbook answer. The teacher worked with students to offer prompting and reassurance through the process and led the class in a collective reflection to enhance their awareness of how using failure can facilitate mathematical formulation.

In the Czech Republic (Vignette 4) and Portugal (Vignette 3) narratives, teachers had to prompt and encourage throughout the learning process to assist students through their struggles as a form of affective scaffolding. These stories highlight how the teachers offered targeted support and prompting at points when students were struggling or losing confidence. This served as a way to diminish the discomfort and also to help them learn how to identify what was causing the failure/struggle and ascertain success paths in moving forward. In Vignettes 1, 5, and 6 the teachers were themselves the learners, and were engaged collaboratively in professional development learning—which was designed to support their creative risks or failure and position them to support each other through challenging risk-taking and open-ended design.

Engaging in risk-taking through open-ended learning tasks can create discomfort, either from concerns about getting the wrong answer, or uncertainty about open-ended tasks. This can heighten fears of failure or embarrassment about potential mistakes ([Beghetto et al., 2014](#)). Scholars studying the process of creative teamwork facilitation have noted that teacher-facilitators need competencies in supporting the coping strategies of participants ([McFadzean, 2002](#)). This kind of skillset for helping students cope with discomfort was evident in several of the narratives reported in this paper.

#### 6.3.1. Implications for learning

One of the roles of teachers is to foster resilience and support learners around social and emotional issues in learning. This role may be reoriented to also help students identify and manage discomfort and move past creative blocks. Many students have grown up in school or national educational environments that are restrictive to creativity and promote single-right-answer responses ([Holland, 2018](#)), and thus often view risk and failure negatively or punitively. This may heighten the natural anxiety that humans already have with risk and failure ([Smith & Henriksen, 2016](#)). Therefore, in order to help them become more comfortable with creative or open-ended activities that involve risk and ambiguity, we suggest that teachers may need to proactively manage discomfort, including helping students to self-regulate and be reflexive. The situated demands of enacting this approach culturally may require more detailed research than is offered here.

Internationally, it is clear that educators need the ability to support students' coping skills ([Schuman, 2005](#)). Specifically, they must manage discomfort that can occur when learners are challenged or frustrated in open-ended challenge tasks. [Bell et al. \(2016\)](#) refer to such moments of discomfort as “learning edges,” or moments when participants, students or learners feel challenged beyond their limits of comfort (p. 122). They suggest reframing such moments of discomfort as opportunities to learn—building educational cultures that help students to identify their own learning edges and how to manage them without shutting down. In pushing through the discomfort of challenge, the greatest opportunities for creativity may emerge and become part of new narratives of success in working with risk and failure.

## 7. Conclusion

We conclude with two points, one about a pedagogical principle suggested by the set of narratives, and also a methodological outcome. First, as a group of scholars concerned about the implementation of creative risk and failure in education, we suggest that it is important to affirm risk-taking as a pivotal pedagogical principle for fostering creativity and preparing learners for the adaptations and flexibility they need in an era of unprecedented change ([Page & Thorsteinsson, 2017](#)). In the midst of a shifting international educational landscape, educators cannot be timid about trying new ideas or be fearful to fail in seeking creative progress and solutions. The complex globalized and digitized world that students will face also requires uniquely creative people, who are able to think about novel problems and solutions, given the intricate global challenges ahead ([Zhao, 2012](#)).

Second, methodologically, the use of curated, cross-national narratives of practice and a structured narrative inquiry approach built on collaborative and dialogic story making, has afforded unique insights. This is true even where the context and cultures were disparate. It is clear to us that the intersections between the grounded experiences of educators that we have observed in different situations was valuable for identifying common issues and possibilities, as well as suggesting cultural and regional differences. While we recognize that these stories are limited, by getting inside these stores as micro-examples, we were able to make useful connections between theory and policy in the six unique contexts of teaching practice. Given the lack of published empirical research in this space, our study is a generative beginning for empirical researchers interested in collecting data about what creativity and risk might look like in situ.

### Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

	Variables or descriptors of location (e.g. city, area, any other details of interest on the location)	Type of educational institution (e.g. higher ed, K12, other...also size of institution or other important details/designations)	General demographics learners within the institution (e.g. ethnicity, age range, socio-economic status)	General demographics of learners in the example/case discussed in the article (e.g. ethnicity, age range, socio-economic status)	Any information about how creativity and risk-taking are dealt with in national educational policy in this context	What factors helped to make the creative risk-taking possible in your example?	What factors made it more difficult to take creative risks or caused challenges in your example?
U.S. Vignette 1	Public school in rural southwest of USA, Title 1 with 54% of students receiving free and reduced lunch.	Grades 7–12 school (recently added grade 6 - after the study was completed). All teachers participated.	Total of 440 students from the following ethnic backgrounds Demographic breakdown of the district was as follows: 53% Hispanic; 41% white; 14% Native American. Given the free and reduced lunch status noted, many families are from lower-income backgrounds	The case study involved a team of 7–8 grade teachers working with members of the university design initiatives team to redesign the 7-8 curriculum through an integrated historical lens. The six teachers who participated most consistently had over 100 years of collective classroom experience, and were ethnically diverse (2 Hispanic, 1 Black and three White). The members of the university design team consisted of an associate dean and two design strate.g.ists.	Creativity is mentioned in the state standards specifically with respect to Arts education but not in any other context. No mention of risk-taking or of implications of creativity beyond the arts curriculum.	First, a recognition that students were not engaged in school-work. Second, the principal was a driving force.	The fact that schools in the state were evaluated on the basis of student test-scores - thus making teaching to the test almost inevitable. For the teachers to take this chance - to try something new that could have had a negative impact on student test scores was courageous.
Australia Vignette 2	Private, religious-based school in Melbourne, Australia. Located in an inner-city suburb.	K-12 school, with a student population of nearly 1000. The class discussed averages 20–24 students.	From a homogeneous ethnic background and from families who are predominantly well-educated and who have a higher socio-economic status.	Year 8 students (13–14 years old) from higher socio-economic families.	Creativity has significant mention in the national Australian Curriculum and in the state-based Victorian Curriculum. No mention of creative risk-taking and minimal elaboration of implications of creativity for the classroom.	The school was open to the ideas of creative risk and productive failure, and this openness was engendered by leadership and embraced by a group of year 8 teachers. The school identifies itself as educationally progressive.	Teachers lack of experience with using creative risk and failure in their classrooms, and resistance from students to uncertainty in an educational system geared to prescribed outcomes.
Portugal Vignette 3	Public University, the oldest in Portugal, from 13 <sup>th</sup> century (1290). The University of Coimbra is in Coimbra, Portugal. Located in the center of the country (54 km to the Atlantic).	The University of Coimbra is a public University with 25188 students. 72 students participated in the study and one teacher (myself).	Most students are Caucasians, middle or low socio-economics status. The University is a UNESCO World Heritage. Most of the students are Portuguese but it receives students from all the world, particularly from Brazil and Spain. The programs include undergraduates, master students, PhD students and pos-doc students.	Most of the sample (n = 72) is Caucasian, Portuguese, but some students are from abroad: 1Chinese student (female), 2 Spanish (2 male), 3 Brazilian (3 female). Ages: 18–21 years. The majority has 18 years. Most of them have middle or low socio-economics status.	Creativity is an important aspect to innovation. In formal education, it is expected that students succeed in the courses they are enrolled in. Risk taking is well approved while failure is not.	The teacher likes challenges and considers very important to challenge students to be creative and to take risks [If something was really bad in their group work, she will create other options, but they did not know].	It is difficult to engage students in challenging tasks which are not in their comfort zone. They have to think and organize ideas differently.

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Czech Republic Vignette 4	A holiday weekly camp for 20 pupils from primary schools in Prague and its surroundings, organized by student teachers at a public university, founded in 1348 and located in Prague, a capital with 1.5 million inhabitants	Grades 3–7 primary and basic school (20 pupils aged in from 8 to 13 years). Five master degree student teachers and one teacher educator (myself) at the Faculty of Education (with about 4900 student teachers)	Pupils - participants in the summer camp - came from a homogeneous ethnic background and families with university-educated parents who are interested in having their child engage in interesting educational activities (e.g. robotics and programming) even in the summer. A group of student teachers who show great interest in their future teaching profession; even during the summer holidays, they are looking for opportunities to take care of pupils, leading them to take an interest in new digital technologies and computing.	Pupils - participants in the summer camp - came from a homogeneous ethnic background and families with university-educated parents who are interested in having their child engage in interesting educational activities (e.g. robotics and programming) even in the summer. Most of the fathers of these pupils work in the IT sector. A group of ICT and Informatics student teachers who show great interest in their future teaching profession; even during the summer holidays, they are looking for opportunities to take care of pupils, leading them to take an interest in new digital technologies and computing.	Creativity is mentioned in the framework educational framework curriculum with respect to Arts or Music or Drama or Film and audio-visual education but not in any other context. Creative activities are also mentioned in a description of learning competence. No mention of risk-taking in curriculum at all.	The summer camp was opened to the creative risk and supported pupil's creativity and originality in computing activities. The program of summer camp activities did not have to follow the official curriculum, it was designed so that ICT and informatics student teachers could apply various innovative methodological procedures.	1. Lack of time. 2. Insufficient knowledge of children. 3. A traditional concept of learning applied in schools, in which the idea of "risking" is not considered.
India Vignette 5	Indian rural schools of West Bengal (A state of India). Medium of education- mother tongue (bangla). English as a second language (EFL).	The students are in class 8th and 9th standard. Total of 300 Class 8th students and 9th students and 20 teachers.	Total students are from rural India. Hindu- 60%; Muslim -40%. Age range- 13–16 years. They are from low socio-economic backgrounds.	Total students are from rural India. Mother Tongue- Bangla; Hindu- 60%; Muslim -40%. Age range- 13–16 years. They are from low socio-economic backgrounds.	We found that they have low confidence and self-esteem in 2nd language performance. The main problem they were facing was when they were being asked any questions from content subjects like science or mathematics in English at any competitive global test. Although they knew the answers but were not able to understand the meaning and failed to connect it to the content/answer. But when the same question is asked in their native language they can answer it well.	The teachers felt significant risk in taking on a project of this size and scope. In a creative learning context, how do students perceive the role of CLIL and critique? What conditions do students identify as being important to stimulating creativity in a CLIL and critique-driven learning environment?	There were two main reasons for this risk of failure. 1.The first has to step out of their comfort zone and lose control of what they had been doing for a long time and 2. The connection of a second language to the science curriculum.

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	Variables or descriptors of location (e.g. city, area, any other details of interest on the location)	Type of educational institution (e.g. higher ed, K12, other...also size of institution or other important details/designations)	General demographics learners within the institution (e.g. ethnicity, age range, socio-economic status)	General demographics of learners in the example/case discussed in the article (e.g. ethnicity, age range, socio-economic status)	Any information about how creativity and risk-taking are dealt with in national educational policy in this context	What factors helped to make the creative risk-taking possible in your example?	What factors made it more difficult to take creative risks or caused challenges in your example?
U.S. Vignette 6	Public school in central Texas in the USA, located in a college town with a combined twin-city population of 200,000, plus 70,000 at the university.	Middle school, Grades 7 <sup>th</sup> -8 <sup>th</sup> (~12-13 years old), total student enrollment on the campus is nearly 1200	74.2% of the students on the campus are economically disadvantaged. Campus enrollment by race/ethnicity was as follows: African American 17%; Hispanic 58%; White 22%; American Indian 0.3%; Asian 0.2%; Pacific Islander 0.2%; Two or More Races 2%	The project involved 30 teachers (secondary and junior college faculty) that participated and worked with a university team on a research experience/curriculum design project. The illustrative case included an activity in an 8 <sup>th</sup> grade classroom on a middle school campus. Students were all enrolled in the Odyssey [STEM] Academy program (an advanced academics magnet program). The race/ethnicity and SES of students in the class mirrored the campus.	Creativity has significant mention in the state standards: in 8 <sup>th</sup> grade technology applications, and in the following career and technical education areas: STEM, information technology, and AV technology and communications. There's no mention of creative risk taking. Among the goals of the Odyssey Academy program are "focus on personal growth and development, as well as creativity," and problem-solving, teamwork, and innovation.	Instructional leaders/teachers really embraced the tenets of the magnet program and import of creativity in the curriculum. At the activity level, students engaged in the design process, to explore multiple solutions. The teacher seemed steeped in approaches to encourage creative risk-taking. The school prominently displays a large banner outside: "Nationally Certified STEM Campus 2019".	For some teachers engaging in curriculum design based on the translation of research experiences was challenging at first. Much like their students, instances of productive failure were entangled throughout the design process. Some teachers became stuck at various stages but were very successful after a few iterations.

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