

Risky business: ICT and creativity

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Abstract: Creativity is now increasingly understood as a fundamental component of a 21st Century framework for education. It is important for learning, such as in problem solving, as well as growth, innovation, and wellbeing of individuals and society. As a consequence teachers are increasingly being asked to teach for creativity. However, risk taking is one of the essential characteristics of creativity. In order for students, or teachers, to be novel or innovative in their practices, ideas, or products they must necessarily take a risk – pushing or transgressing the boundaries of what they understand to be familiar and safe. Creativity is complex. It is hard to define, difficult to recognise, poorly understood as a thinking skill and as such it is hard to teach *for*. In addition, the high stakes of classroom education instils an aversion for both educators and students to the risk taking that is necessary in the pursuit of creativity. However, it has been proposed that ICTs can facilitate students taking risks. This paper reports on a qualitative case study that explored the ways in which seven teachers perceived and facilitated risk taking through the use of ICTs. The results confirmed that ICT could be used as a tool in the encouragement of risk taking. ICT allowed risk taking to occur in ways that motivated students while shielding them from possible failure and adverse criticism from their peers. However, it was also found that nurturing such a climate for creative risk taking took a degree of skill, particularly on the level of student management, which amounted to risk taking by teachers in their teaching practice.

Introduction

The notion of creativity has become pivotal to our economic prosperity and a core tenet in curriculum internationally – whether explicitly mentioned or implied such as through expectations of innovation and originality (Florida, 2014). Creativity can be found in many disciplines: mathematics, science, commerce, and technology to name a few. Indeed, creativity should not be considered to be the exclusive domain of a few gifted individuals but rather that all people are capable of creative achievement (Craft, 2001b).

Creativity involves a complex and poorly understood process of thinking. It is not a body of knowledge or procedure that can be taught. However, it can be learned (Jeffrey & Craft, 2001). Education has a key role in facilitating the development of creativity - to manifest what Jeffrey and Craft (2001) term “creative empowerment” (p.5). For teachers this means not merely teaching creatively but teaching *for* creativity (NACCCE, 1999). This includes adopting classroom pedagogies and teaching practices that encourage and sustain creative thinking and creative behaviours in students (Craft, 2001; Joubert, 2001; Sternberg & Lubart, 1991).

However, creativity is a complex concept without any clear consensus on exactly what characteristics constitute it. The following section explores various conceptions of creativity in greater detail but it is valuable to note here that creativity is often described in terms of individual attributes, characteristics or traits such as ability to transform things, flexibility, originality, novelty and risk taking (Beattie, 2000).

Risk taking (although sometimes referred to in different ways) is an essential trait in most conceptualisations of creativity. Risk is generally understood to be a state of uncertainty - not just that an expectation is unmet but that some undesirable event may occur (Hansson, 2011). Furthermore, risk-taking as a characteristic of creativity is subjectively understood (Amabile, 1996), involves emotional exposure (Davis, 1999), is situationally dependent, and is fundamentally about making evaluative choices (Candy, 1997). The complexity of risk taking is further revealed when it is considered that creativity is arguably a social process requiring the legitimising of practices and outcomes by a community (Leach, 2001). For example, the degree of risk taking in a student’s creative endeavour within formalised curriculum is partially defined by the fact that the creative outcome needs to be understood and valued by the teacher and the institutionalised values which they embody. It is not surprising then that the high stakes of classroom education instil an aversion to risk taking in the pursuit of creativity for both educators and students.

Coupled with this growing awareness for the need to teach for creativity (NACCCE, 1999), is the notion that ICT can foster such creativity (Edmonds, Candy, Fell, Knott, Pauletto, & Weakley, 2005). Unfortunately, the connection between ICT and creativity in many cases is tenuous or assumed – such as the assumption that asking students to create a video leads to creativity. However, there is a small but growing body of work from various disciplines that adopt a theorised understanding of creativity and asks how ICT can facilitate or hinder that process (Lubart, 2005; Shneiderman, 2000). This small exploratory study investigates how teachers understand and encourage creative risk taking behaviours. More specifically, the study asks how ICT can facilitate or hinder that process.

Creativity

This paper focuses on the potential role of ICT in facilitating conditions for risk taking in pursuit of creativity. As such it is necessary to build a robust understanding of creativity and its connection with risk taking. The concept of creativity is complex and over the years there have been many proposed definitions and theoretical models. Creativity is not a homogeneous term however some authors have argued that there is a certain congruence among the theoretical models that allows us to identify a working definition of creativity for education purposes. Consequently, this paper uses the NACCCE (1999) definition of creativity: “an imaginative activity fashioned so as to produce outcomes that are both original and of value” (p.30). However, a concise and universally agreed upon definition is elusive, with a greater part of research in the field focusing on the traits and characteristics which make up and determine what we perceive as creativity.

This line of enquiry has led some researchers to study the particular traits and characteristics of famous creative people and has been referred to as ‘big creativity’ (Feldman, Csikszentmihalyi & Gardner, 1994). This view has a rich history with psychologists like Freud delving into the unconscious desires of famous artists in the hope to decipher those particular traits which enabled their creativity. Others however like Guilford (1950) in the 1950’s looked at creativity from a wider cognitive perspective as a combination of personality traits and intellectual abilities in all people. More importantly far from being the exclusive domain of particular gifted individuals, creativity or rather what Guilford called the ‘creative impulse’ was something that could be found in everyone.

Behaviourists viewed this differently emphasising the environment as the most important factor influencing creative behaviour and not personality traits. Creativity from their perspective could be developed in people by manipulating environmental factors. Humanists on the other hand looked from the inside out asking how do individual’s actualise their full potential and develop their creative self to its fullest. By the 50’s and 60’s this more or less psychometric view became manifest in Torrance’s Test of Creative Thinking TTCT, they were a series of creativity tests for students which use problem solving to determine the level of creativity a student has. These tests are still used particularly in the USA today (Kyung Hee Kim, 2011).

By the 1980’s the theoretical research focus had shifted to one based around social psychology and systems theory (for example see, Jeffrey & Craft, 2001; Ryhammar & Brodin, 1999; Feldman & Benjamin, 2006; Leach, 2001). This systems model is significant for education and the concept of creativity as it placed a greater emphasis on the creative process. Creativity and the individual in this context was seen as one built around social relationships and social interactions. The importance of systems theory for education was twofold: firstly, creativity is seen as something all persons are capable of doing not just some. Secondly, creativity stems not only from an individual’s innate capabilities but also from social and environmental conditions which ultimately could be stimulated, fostered and developed. In other words, we can teach for creativity.

This idea of developing creativity in people was not new and had started in the 1950’s with the likes of John Guilford. However, what the social or systems theory did was to bring together social, individual and environmental factors into a dynamic process of interaction between domains, persons and fields. Or in a nutshell a view of creativity as sets of rules, individual experiences and social relationships subsumed in a dynamic amalgam of change. Creativity in such a system could be viewed as being in a state of flux which ranges from breaking rules on one hand to negotiating and replacing them on the other. For example, creativity can be found when an individual ‘makes the familiar strange’ or ‘plays with an idea’ or where a person ‘attempts something different when all else fails’ (Amabile, 1996, 88-89). From this perspective the research work of Amabile (1996) has been pivotal in developing a model where by the individual uses a series of personal traits or ‘styles’ to negotiate a social system which may or may not result in creative outcomes. Keeping in mind that each social, personal and environmental system is different. What Amabile’s research proposes is that in a systems theory of creativity the creation of something new and unique involves a combination and use of ‘cognitive styles’ in an interplay of social forces which involve knowledge, social and personal attitudes and individual intrinsic and

extrinsic motivation.

While Amabile's model is drawn towards cognitive styles as a set of traits with which creativity can be articulated and facilitated in a systems model of creativity other similar researchers such as Csikszentmihalyi (1994), Feldman (2006), and Gardner (1963) view creativity as domain specific. That is to say their focus is towards the characteristics utilized by individuals to traverse a body of knowledge and its 'knowledgeable others' or gate keepers (Gardner, 1995, p15). Consequently, they focus on 'big creativity' and the particular characteristics of creative people such as self-absorption, self-promotion or social marginality to name but a few (Gardner 1993). However, of more interest to the educator is the notion of 'little c creativity' (Craft 2001b), which has focused on the "resourcefulness and agency of ordinary people rather than the extra ordinary contributions of a few" (p. 49).

Craft's notion of 'little c creativity' is far more useful to the educator as it brings together the social psychological and systems approach to creativity in to a framework which can be seen as a set of applied articulations or dynamic characteristics such as 'possibility thinking' and 'different ways of asking what if' and more importantly 'risk taking' (Craft 2001b).

Risk taking

Risk taking as referred to in Craft's (2001b) notion of 'little c creativity' involves basically two parts; an action with a possible outcome that may or may not occur but also a personal investment in the event that may or may not occur. For educators this notion of personal investment is an important one as it involves motivation and emotional exposure which become a significant factor in the context of the classroom subsumed with the pressures of curriculum, assessment, peer relationships, identity, and teacher relationships. As Davis (1999) notes risk taking and creativity in student creative work requires a careful balance by the educator of these factors, particularly in the context of motivation.

Amabile's (1996) use of the intrinsic motivation hypothesis of creativity is also useful. This is the notion that students who are intrinsically motivated are more conducive to being creative while extrinsic motivation can be more detrimental to creativity. In other words, there is a higher propensity for an individual to take risks in creative design work when they are intrinsically motivated. Moreover, this can be fostered and nurtured in the context of the classroom especially when the tasks students undertake are problem solving tasks. That is to say, students are prepared to take risks and 'break set' outcomes when certain types of 'cognitive style' are employed such as the propensity of a student to drop one strategy for a fresh one or reject an established pathway for a different one (Amabile, 1996).

From an educator's perspective and central to this research has been whether a classroom climate can be facilitated using ICT which is conducive to students being intrinsically motivated to adopt more risk taking cognitive styles. Leach (2001) calls this establishing a 'learning culture' which broadly encompasses factors such as cohort, subject, school culture, teacher expertise in ICT, and student collaboration particularly in relation to art and technology subjects. The fusion of ICT and the learning culture comes in the form of what Candy (1997) calls the elements of "creative cognition" (p.9), differing from Amabile's cognitive styles by emphasising a system of processes which include ideas generation, problem formulation, strategies, methods and expert knowledge.

The use of ICT to support and encourage creativity has been researched for several decades, covering a broad range of areas. Some examples in relation to creative design include studies on ICT tools which allow visualisation of the problem space (Oxam, 1997) computer use in creative design work (Candy & Edmonds 1997; Shneidermann, 2000) creativity and computer based learning environments (Kampylis, Fokides & Theodorakopoulou, 2011) and more recently creativity and multimedia tools (Kassim, Nicholas & Ng, 2014). Most of the research has revealed a connection between ICT tools, particularly visualisation tools, and creativity. However, it must be emphasised that the ICT tools themselves do not guarantee outcomes. That is to say, not all ICT tools support creativity. As Yamamoto and Nakakoji (2005) note, ICT tools must be carefully chosen to allow for the greatest possible creative alternatives. Risk taking in creative design can thus be enhanced from the wish to explore all possible situations, keep options open, compare and select preferred outcomes (Lunzer, 1999). For educators therefore the choice of ICT software and the level of expertise becomes critical in encouraging risk taking in creativity as software which can be difficult to master or lacks intuitive exploration may make risk taking in creativity more difficult to initiate and also diminish student intrinsic motivation to take risks.

Research Design

The research design draws on a qualitative case study methodology. Data were collected from seven teachers (3 female, 4 male) of subjects that valued design creativity including Art, ICT and Design Technology. Their teaching experience ranged from 6 to 30 years. These teachers worked in the same state secondary co-education school of approximately 830 students in the outer western suburbs of Melbourne. ICT resources were a range of ICT computer labs, classroom computer pods and a small number of laptop trolleys with Apple laptops. The seven teachers participated in two rounds of semi-structured interviews lasting approximately 30 minutes. The initial round of interviews was followed by unscheduled classroom observations from which observational field notes were taken. In addition, a process of post-class debrief and member checking was used to validate the interview and observation data. Finally, additional data were collected in the form of class computer bookings and teacher lesson plans to help stimulate the interviews as well as triangulate themes.

The analysis of the data utilised William Trochim's 1989 Theory of Pattern Matching. This method was used to identify risk taking themes and patterns derived from the research literature to assemble eight constructs and their attributes in order to classify data from the teacher participants. These eight constructs were risk taking and creativity, risk taking and student motivation, risk taking and the learning environment, risk taking and the management of student failure, risk taking and student collaboration, risk taking and ICT in student design work, risk taking and ICT resources, and risk taking and teacher professional management. See Casimaty (2014) for a detailed discussion of the development of the constructs.

Findings and Discussion

In general, the teacher respondents found ICT to be enormously flexible in supporting creative processes particularly when partnered with an environment where students were able to side step the constraints imposed by the demands of the curriculum. This flexibility allowed students to explore in a manner and process that enabled alternative directions and possibilities as well as the collaboration and the exchange of ideas that were conducive to student risk taking in creative design. Moreover, it was apparent that when ICT was used to encourage risk taking it required the teachers to adapt classroom strategies to provide students with greater autonomy in determining the use of ICT, the outcomes, and the level of risk taking they were prepared to take. Unsurprisingly such risk taking was particularly evident where teachers established a high level of trust between themselves and their students.

In particular, the research highlighted 4 key findings. First, ICT was perceived to encourage risk taking through enabling iterative and non-linear explorations of alternative possibilities. For example, it was observed that students were able to use ICTs to change, alter and search for different ideas throughout the design process, not having to commit to one course of action until further down the track then they would otherwise need to do if completing the task by hand. This was confirmed by the teachers, for instance Margaret, an art teacher of 7 years, claimed that "students are more likely to take risks with work that was being done on computer rather than original art work that was being done by hand." This point was extended upon by Judy, a teacher of textiles, who noted that unlike paper based methods, ICT allowed her students to solve creative problems in "a very round-about way" by seeking alternative pathways to problem solving. The processes described by the teachers resonates with Amabile's (1996) description of processes that facilitate risk taking; where the "old set of unsuccessful problem solving strategies is abandoned and the search as a result moves off in a new direction" (p.88).

The use of ICT to support the exploration of alternative 'solutions' has several advantages in terms of risk taking. Typically, there is not only a potential risk in "wasting time" by choosing fruitless options, but there is also a risk to one's identity and self-esteem. As Davis (1999) claimed, there is an emotional exposure inherent in risk taking which can come from a variety of sources such as fear or failure, peer criticism or frustration at the poor level of skill required by the design work. The findings strongly supported that using ICT could lessen the fear of failure when a student took a risk, particularly because their work could be 'undone', tweaked without having to do the whole thing over again, and was more private/hidden/contained within their device which shielded them from unwanted observation by peers.

A second finding which extended from the first was that risk taking in creative tasks was enhanced when the software supported visualisation of alternative procedures and outcomes. Similar findings were made almost two decades ago by Candy (1997) when discussing the comparatively limited facilities of early digital image manipulation. The same dynamics were found in this study, for instance, Margaret noted that students were more likely to take risks with their creative designs when they could scan images and work over the top of what they

had already done without damaging the original work. However, over the last two decades there has been an increase in the kinds of software that allows students to visually explore alternative possibilities. For example, Ethan the Robotics Teacher noted that the intuitive ‘drag and drop’ menu of Lego Robotics Lab interface, which allowed students to connect symbols on the screen and run a simulation, provided “lots of flexibility...that way if you took a risk it would still come off”. Similarly, Cooper one of the ICT teachers noted that his students demonstrated a greater willingness to take risks and explore outcomes with Garage Band. However, the teachers noted that not all software equally supported student risk taking.

A third finding was that risk taking also required a high degree of student motivation. This finding was particularly congruent with the literature of Amabile (1996) and Davis (2000). In this research there was a clear connection between student motivation and the nature of trust that was evident in the class; students needed to be able to act without peer group pressure or vilification and to feel supported and understood by their teacher. It was evident that teachers needed to carefully establish trust within their class, if students were to take risks. In this study, despite only seven teacher participants, there were a variety of strategies utilised to increase the level of student motivation to take risks in their creative design work. Some teachers adopted a more intrinsic motivational strategy of a ‘show and make’ approach which Davis (1999) claims can support risk taking by “sharing the risks associated with the learning process” (p.107). For example, Margaret recounted that she would “generally show them something I have done and *examples* of how I got to a point and then let them go for it” (emphasis added). In contrast, teachers such as Stacey placed strong emphasis on extrinsic factors such as a relaxed environment where students were not compelled by time and curriculum constraints so they could take risks with their creative design work without the pressure of having to come up with a ‘final thing’. This finding highlighted risk taking in creative design was linked to the degree of trust students had with their teachers to manage the process or risk taking and creativity. Importantly, the level and degree teachers were prepared to be flexible with the curriculum, school priorities and student outcomes were significant influencers in motivating students to take risks.

A fourth finding was that risk taking in creative work could be suppressed when students collaborated using ICT. All the respondents agreed that collaborative group work among students using ICT was conducive to the exchange of knowledge and ideas, particularly in relation to procedural or ‘safe’ choices. For instance, a teacher observed, “if they are mates they start teaching each other and they learn from each other because they feel comfortable and they work together” (Stuart). However, the teachers also indicated that their students were likely to take more risks with creative work individually rather than when working as a group. Judy, the textile teacher, remarked “they are more creative when they are working on their own...because when they work as a group I feel they tend more towards the safe side.”

It was clear from the teacher responses that while risk taking using ICT in creative design work was occurring, it was being tempered by the dynamics of the learning environment and group arrangements. That is to say that different activities and activity spaces had an effect on the level of risk taking students were prepared to contribute towards creative design tasks. The level of student ICT skill strongly determined the nature, composition and outcome of risk taking in student creative design work. As Margaret noted “the software comes into it when you have some that are better than others...in such a case students working in groups could hold each other back and they are not prepared to take risks in front of each other”. Therefore while the respondents acknowledged collaborative group work among students using ICT was conducive to the exchange of knowledge and ideas it did not necessarily translate to greater risk taking in student creative design work, the sharing of ideas being limited by the tendency of students with stronger ICT skills to dominate ICT collaborative tasks.

Conclusion

Risk taking as an essential element in student creative work. Indeed, it has been argued that without any risk taking there can be no creativity. This study focuses on the notion that ICT may play a pivotal role in encouraging and inducing student risk taking, especially in design focussed subjects.

Our study adds to the current literature confirming that in some circumstances ICTs can facilitate individual and collaborative risk taking. ICT can help students in two key ways: (a) to generate alternatives and new ideas, and (b) to keep their options/possibilities open for longer, sustaining them in periods of ambiguity which is a component of creative thinking. It was observed that ICT supported these processes in a variety of ways including: the ability to (re)present ideas such as visually that generate new connections and ideas; experimentation, simulation, and rapid prototyping of ideas to test out potential approaches and outcomes; mitigating consequence through the ability to ‘undo’ and revisit/mash iterations of design; and the ability to engage in non-linearity in processes.

Nevertheless, the high stakes curriculum and social contexts of classrooms need to be recognised as they constantly act to compromise potential of ICTs in supporting risk taking. Our work confirms that despite the affordances of ICT for experimentation and iteration: students and teachers need permission to fail; risk taking is encouraged when teachers and students negotiate an understanding of the boundaries of risk particularly in relation to learning outcomes; and that high levels of teacher student trust is critical. Furthermore, that peer pressure is significant, particularly in collaborative creative work. ICTs added to this complex interplay. For instance, in our study it was revealed that the ICT proficiency of a few students could dominate the creative collaboration, and risk taking, of the group.

In general, the teachers reported the use of ICT as a positive tool in the encouragement of risk taking, particularly in relation to student creative design work. The findings also showed that ICT allowed risk taking to occur in ways that motivated students while shielding them from possible failure and adverse criticism from their peers. However, it was also noted that nurturing such a climate for creative risk taking took a degree of skill, particularly on the level of student management, which amounted to risk taking by teachers in their teaching practice. In other words, creativity is necessarily risky business.

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