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# Secondary school creativity, teacher practice and STEAM education: An international study

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**Abstract** How creativity in education is applied by teachers to secondary school contexts is dependent on how the term 'creativity' is grounded, politicised, and practised. This paper reports on an international study of secondary schools in Australia, USA, Canada, and Singapore investigating how creativity is understood, negotiated, valued and manifested in secondary schools, focusing on teacher and student understandings, actions, benefits and impediments to creative and critical thinking. Participant reflections revealed inter-, trans- and cross-disciplinary learning shaped by teacher collaboration, dialogue and classroom organization that fosters critical and creative thinking. Implications are made for the ways practicing teachers develop and foster creativity via pedagogical approaches that enhance connectivity and interdisciplinarity of teaching practices between domains of learning. An education-based Creativity Index through which administrators and teachers can gauge, assess and implement creative skills, capacities, pedagogic practices and assessment of creativity within secondary schools is posited. Implications for STEM/STEAM education and centralizing creative capacities in teaching, learning, and educational change are offered.

**Keywords** Secondary schools creativity · Teacher training · STEAM education · Creativity Index for schools

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## Introduction

Creativity in education is becoming a more centralised and dominant aspect of scholarly discourse. Whilst creativity and critical thinking play an explicit role in developing and understanding future economic and social drivers, notions of what creativity is in an educational sense remain vague to both policymakers and to educators. Scholarship encouraging creativity relating to educational policy, practice, and the application of creativity reflects upon dilemmas, debates, and tensions which are played out in a variety of ways within and across national and international borders. Scholars assert that creativity can be stifled by educational practices which avoid and discourage it, and be encouraged by cultures that value and promote creative abilities (Averil et al. 2001; Craft 2002; Garner 2007)

The interface of creativity and education has been described by Craft et al. (2008) as "a capacity for significant imaginative achievement" (p. 15), and continues to assert an imperative of consideration in developing critical thinking in learners (Runco and Jaeger 2012). Primary conditions of creativity emerge from learning experiences within dynamic atmospheres and environments, that engage learners in climates of anticipation and expectation (Davies et al. 2013). Current concepts of creativity detail connections between individual and environment, self and others, creator and culture, emphasizing the role of community constructs of culture and social context within distributed notions of creativity (Glăveanu 2014). Scholars have utilized the notion of creative abilities on the development of understandings, skills, processes, appreciation, and thinking (Jeffrey 2006), "possibility thinking" and immersive states of "flow" (Csikszentmihalyi 1996), as core to creative learning (Craft 2005), involving convergent as well as divergent thinking. Conceptual interpretations between big 'C' creative enterprise as a complex set of behaviours and ideas exhibited by individuals and small 'c' creativity locating creative enterprise in the processes and products of collaborative activity, and their synthesis with the needs of effective twenty-first century learning continue to be explored (Craft 2008).

Research pertaining to creativity in schools has in numerous instances strengthened creativity as a national and educational priority. England, Wales, Northern Ireland, Scotland and European nations (Creative Scotland 2013; Creative Partnerships UK 2012; European Parliament and the Council 2006) value the importance and diversity of creativity in curriculum and pedagogy at the compulsory schooling level throughout Europe (Cachia and Ferrari 2010; Heilmann and Korte 2010) as well as in China (Vong 2008), Hong Kong (Leong 2010) and Greece (Cross-thematic Curriculum Framework 2003). The Australian government's *Melbourne Declaration on Educational Goals for Young Australians* (which sets educational priorities for 10 years) has committed the nation to developing 'confident and creative individuals' (Ministerial Council on Education Employment Training and Young Affairs [MCEETYA] 2008). Yet, whilst the development of creativity is critical for twenty-first century learners (Harris 2014, 2017; Csikszentmihalyi 2006; Florida 2003), educational discourse purveys many different

approaches and lenses through which creativity and creative learning are applied in practical terms (Harris 2016; Banaji and Burn 2007; Eisner 2002).

## Creativity and talent

Links and interconnections between creativity and arts are now being revisioned to connect various domains beyond the arts, asserting not only the possibilities, but also the educational significance derived from immersing in creativity inducing activities across arts, maths and sciences, and the positive self-motivating effects imbued within this holistic and domain-transparent creative learning. This realignment of understanding necessitates the need to re-imagine the ways creativity can be taught and fostered through interdisciplinary structures. The most significant pedagogical developments in twenty-first century learning may not be just the continued specialisation of skills and knowledge, but the pedagogical developments through which educators and educational institutions organise learning and teaching in ways that fuse arts, sciences, mathematics and humanities domains through contemporary real-world curricula that enhances learning potentials, creative possibilities and adaptive growth-mindsets in learners. How teaching enhances creativity in learners may be a driver of new institutional conventions, cultural forms and everyday learning interactions (de Bruin 2015).

Importantly, these modes of thinking, learning and teaching imply that *all* students are capable of creativity, creative processes, acts and products, and that students' abilities (their 'talents' to and of creativity) can be fostered and in the vast majority of cases improved. Talent is a developmental construct that progressively emerges into well-trained skills, and the talent development process consists in transforming specific natural abilities into skills that define competence (Gagné 2004). Talent—like creativity—is a developmental process that is emergent, develops over time, and responds to effective environments and relationships that enhance its growth. Creativity, talent, self-efficacy and volition to acquire and develop skills (Corno 1993) can be fostered through learning constructs that maximise inquisitiveness to learn, and the values and rewards teachers attribute to creative thought. The ways these processes, potentials and products are interwoven and embedded over time within an educational system are significant in fostering creativity (Amabile 1996; Csikszentmihalyi 1996; Teece et al. 1997). Thus, the ways teachers, environments and curricula are shaped around creativity-enhancing processes and procedures is of paramount importance to igniting, fuelling and maximizing creativity.

## Creative processes, pedagogies and ecologies

Research concerning creativity in education has investigated various features and traits associated with the development of creativity in learners. Cheng (2014) attributes the creative process consisting of four main stages: preparation (problem perception), incubation (a gestation period through unconscious mechanisms),

illumination (when the ideas for a solution appear), and evaluation (when ideas are tested and their validity and utility are assessed). Creative thought processes (Mumford et al. 1991), creative problem-solving skills (Williamson 2011), creative thinking (Torrance 1977), creative learning (Jeffrey 2006) and possibility thinking (Craft 2000) have been appropriated within the inclusive term of 'creative skills'. Teachers draw on various resources and capabilities, environments, pedagogies and learning environments to enhance these creative skills and processes (de Bruin and Harris 2017). Evidence spanning various schooling curriculum and age-ranges suggest that where students are given some control over learning and are supported in risk-taking, learner creativity can be enhanced (Burgess and Addison 2007; Cremin et al. 2006; Ewing 2011; Gandini et al. 2005; Grainger et al. 2005; Hall et al. 2007). A growing number of creativity studies have investigated the ways teachers utilize strategies to promote creativity. Gkolia et al. (2009) and Rutland and Barlex (2008) suggest that activities that require elements of novelty can stimulate creative responses from pupils. Rutland and Barlex (2008) further establish that interesting, relevant and motivating activities with exciting starting points and ongoing stimulus of materials can develop creativity. Studies on teachers show that supportive collegial environments that allow the transfer of information and knowledge, skills, conceptual, pedagogical and larger structural affordances such as timetabling, freeing of subject domains, and staffing organisation can further enhance creative events and possibilities in classrooms (Downing et al. 2007; Thomson and Sanders 2010; Troman et al. 2007).

Discourse within creativity research advocates the benefits and importance multi-, inter-, trans-disciplinary and cross-disciplinary pedagogical approaches support creativity (Tan 2014). Multi-disciplinary teaching can involve a transfer of methods (Nicolescu 1997), an integration of contents (Moran 2002) and collaborative teacher effort through the coordination of resources and pedagogies. Multi-disciplinarity involves coordination of knowledge of multiple disciplines or sub-disciplines, with little or no modification of knowledge of creativity (Aagaard-Hansen 2007). Inter-disciplinarity further engages teachers' efforts to integrate contents and methods of two or more disciplines in achieving a common goal (Holley 2009), utilizing processes of mutuality and reciprocity to shape multiple domain knowledges and break out of disciplinary boundaries (Moran 2002). Cross-disciplinarity is a process towards the integration of 'normally' distinct siloed knowledge and teaching methods, that situates a reciprocal cultural setting of learning and teaching of knowledge across domains (Aagaard-Hansen 2007).

Schools and teachers directly impact creative capabilities within their community, influencing the way creativity develops, evolves and is valued. Teacher dialogue and interaction that engages inter-, trans- and cross-disciplinary approaches can apply and impart upon students' inter-domain knowing and thinking that integrates parallel, sequential, common problems, shared conceptual frameworks and engage students in 'negotiating boundary crossings and applying a combination of modes of thinking in the generation of new outcomes' (Dillon 2008, p. 261). Boundary-crossing promoted by teachers enhances students learning and 'ability to change perspectives, to synthesize knowledge of different disciplines, and to cope with complexity" (Spelt et al. 2009, p. 366). Peters and Besley (2013) argue

that effective knowledge cultures are based on shared practices of epistemic communities that schools create and nurture, where knowledge production and dissemination occurs through exchange of ideas between teachers and domains of knowledge. Systematic integration of modes of learning can establish common languages of creativity for communication within and across disciplines, enabling teachers to develop creative pedagogies as tools that promote association, comparison, analogy, blending, and metaphor with students (Boden 2004; Dillon 2008). Chang (2014) further suggests that schools foster creative climates by effectively and innovatively organizing knowledge ecologies in, through and between domains, and affect positive relationships within creative climates that foster creative development. Amabile (1997) adds that creativity is supported when collaboration is encouraged, and structural, social or political impediments are minimized.

Finland's continued attention to a constructivist mentality in providing sound learning environments for students, quality of teacher training and a growth mind-set towards curriculum and pedagogical reform through multi-disciplinary approaches is reflected in their new national curriculum and the pedagogical approaches teachers are encouraged to develop (FNAE 2016). World-wide, and indeed within Australian/New Zealand secondary education grapples with STEM initiatives (Science, Technology, Engineering, and Mathematics) as well as STEAM, that utilises the Arts as a fulcrum through which sciences, mathematics, structural and technological design learning can be explored and experienced. The Australian Parliamentary 'Inquiry into innovation and creativity: workforce for the new economy' (Commonwealth of Australia 2017) found teachers ill-equipped to teach a grouping of STEM subjects, as well as students perceiving a lack of 'relevance of STEM subjects to their everyday life' (p. 21). The evidence of this inquiry painted 'a picture of a system that is out of balance and exhibiting signs of stress because non-specialist teachers are unable to keep pace with the need for STEM teaching in schools' (p. 26). The inquiry considered the significance of the arts within STEAM, recommending that the 'National Innovation and Science Agenda explicitly recognize the importance of STEAM, creative digital skills, the creative industries and the arts more generally' in secondary schooling (p. 40).

## Purpose of study

This study responds to a global challenge to provide educators and schools with implementable and sustainable tools for enhancing creativity in secondary schools through observing and interpreting inter-disciplinary approaches teachers adopt and develop in enhancing creativity. Dismantling the cloak of obfuscation and confusion of vitally important skills required by educators, this study offers international comparative data for policymakers, curriculum and pedagogy specialists, schools, educators and teacher training institutions by offering a large-scale, mixed-method internationally comparative data set with Australia at its centre.

Creativity training in teacher education courses is an underdeveloped field, requiring greater inter- and trans-disciplinary understanding of creativity's role; this

study establishes current Australia-based data from which to build a framework for sustainable teacher-education in creativity. The education sector continues to grapple with a consistent and measurable definition of creativity, the appropriate methods to develop creativity, and approaches for training preservice teachers to enter the workforce ready to develop student creative capacities. As Burnard (2011) evaluates, 'teachers are expected to act effortlessly, fluidly, to take risks, be adventurous, develop pedagogy and classroom creativity in order to develop their own knowledge and skills as creative professionals' (p. 51). In highlighting interpersonal and collaborative actions and processes teachers engage in and develop (both significant aspects of creativity and talent enhancement), this study breaks down impediments to creative pedagogies negotiated by teachers.

This study produced a reliable set of regionally and internationally comparable data that provides education and creative industry policymakers, identifying significant potential for sustainable development for creativities developed in secondary schools. This critical research offers guidance and implications for developmental change in teacher pedagogies, and promotes the need for teacher education to better equip new teachers with 'creative pedagogical skills' that support creative, critical and innovative thinking practices in students.

## Study design

Many validated tools and protocols were considered for best measuring perceptions, practices and spaces of secondary school creativity in this study. This study was informed by literature that valued the social and collaborative nature of creativity, the role of external influences and social dependencies to individual creativity (Koestler 1964), and the impact of external influences upon creative behaviour (Fillis and McAuley 2000), and these understandings shaped the consideration of appropriate tools utilized in the measurements.

Whilst a number of creativity education tools measure the individual (Lin and Cho 2011; Cho et al. 2011; Lucas et al. 2012, 2013), an environmental approach traditionally used in business organisations was most apposite for assessing a whole school environment for creative efficacy. An initial survey of creativity measurement tools literature was conducted (Harris and Ammerman 2016) which informed the research design for this study. Several tools were considered, including Isaksen's Situational Outlook Questionnaire (SOQ) and the Eysenck Creativity Index that measured benchmarks of vitality and sustainability of a creative environment that considered knowledge creation, diffusion and adaptation. The Amabile KEYS tool (1995) proved problematic in the requirement of a qualified facilitator, and required sophisticated language understanding. The Five Creative Dispositions Model (Lucas et al. 2013) presented a rich schema that expanded on Guilford's individual trait theory (1950) which contextualized creativity as a socially, environmentally and socio-culturally situated learning process. Lucas' model outlines five core dispositions of the creative mind:

1. Inquisitiveness: Uncovering and pursing interesting and worthwhile questions, wondering and questioning, exploring and investigating, and challenging assumptions that enable the individual and others to think things through and develop new ideas.
2. Imagination: Playing with, manipulating and improving possibilities, synthesizing ideas intuitively to make new connections of thought and process.
3. Persistence: Sticking with difficulty, daring to be different, and tolerating uncertainty through sensible risk-taking.
4. Discipline: Developing techniques, crafting and improving, reflecting critically and evaluating skills and creative endeavour.
5. Collaboration: The social and collaborative nature of the creative process through contributing, sharing, giving and receiving feedback and collaborating collectively.

## Qualitative data

The qualitative data gathering process included interviews with participants comprising 24 focus groups from Queensland, Victoria, New South Wales, Tasmania, Western Australia and the Northern Territory. Four focus groups were assembled in the USA, 2 in Canada and 2 in Singapore. Teachers were first asked to identify creative experiences within their classrooms and opportunities for their creative approaches, their own professional creativity education development, and 'hot spots' (classes, extracurricular groups and activities, spaces) in which creativity thrived in their schools, or in which they as teachers and leaders felt they could experience or lead creative pursuits. They were then asked to elaborate on these thoughts and reflections, discussing collaboration with others, and perceived cause and effect from their actions. Though focus groups proceeded in a semi-formal fashion, a manifest of questions is provided ("Appendix 1").

## Data analysis

Statistical data was extracted through Dedoose software. Participant interviews and transcripts were completed by the lead researcher and were organised via a three-step process. Firstly, all text was open-coded through an 'immersion approach' that established preliminary interpretations (Pothoulaki et al. 2012; Robson 2002). Multiple readings accompanied by general note taking summarized chunks of data into initial groupings of nine emergent themes that were filtered into four tentative pools of categories (Charmaz 2003). Secondly, key words and phrases were then extracted, which were drawn up in a table containing exploratory notes in the margins of the manuscript as clarifying interpretations (Pothoulaki et al. 2012). These interpretations were then grouped together, revealing four distinctive categories of thematically separated experiences in which qualitative data is presented; understandings of creativity, experiences of creativity, enhancement of creativity/creative spaces, and impediments to creativity.

### Limitations

While the small sample size of teacher interviews in Canada and Singapore prevents this study from drawing generalizable findings, there were clearly emergent themes when compared to the large Australian USA data set, that indicate clear differences and similarities between the teachers' perceptions of creativity in their classrooms and schools, and how they nurture diverse, multiple and at times idiosyncratic creative experiences, all whilst fulfilling curriculum guidelines and conforming to administrative stipulations. The distribution of teacher participants in Table 1 distinguishes between the number of teacher participants in each country, and the classification of teacher as Arts or non-Arts centric.

### Findings

The dominant themes elicited from the data reveal thoughtful, adaptive and innovative approaches teachers utilized in developing creativities in their classrooms. Teachers reflected on their practices and their own reflexive problem-solving solutions to providing and facilitating creative thoughts, processes and actions. These reflections span individual accounts of practice, as well as multifarious adaptations of teaching that demonstrated multi, inter and cross-disciplinary collaborations, effects and affordances to nurturing creativity.

## Understandings of creativity

Teachers described creativity as involving identifiable and transferable skills and abilities involving problem-solving, imagining possibilities, criticality/critical reflection, open-mindedness/flexibility thinking, teamwork/collaboration, risk-taking, questioning, and developing mastery through a toolbox of theoretical and practical ways of working. Teachers utilized class activities that engaged and developed curiosity/independence, empathy, analytical skills, resilience, complexity, and communication in thinking aloud and sharing problems.

**Table 1** Distribution and classification of teacher participants

| | | |
|---|---|---|
| Australia | 41 teachers | 14 Arts 35%<br>26 non-Arts 65% |
| USA | 21 teachers | 9 Arts 40%<br>12 non-Arts 60% |
| Canada | 6 teachers | 2 Arts 33%<br>4 non-Arts 66% |
| Singapore | 7 teachers | 3 Arts 40%<br>4 non-Arts 60% |

## Singapore

Teachers offered a range of definitions to creativity including: thinking out of the box, exploring possibilities, and developing creativity as a way of thinking and working. Collaboration, problem solving and flexibility (able to make moment by moment creative decisions which respond to the possibilities in the moment and in the context) were discussed as important aspects to building creative capacities. Teachers described using pedagogies that expanded individual learners' isolated experience to learning prevalent in Singapore schools. Teachers utilized collectivisation of students within teams, and let students' problem-solve issues in groups. By organizing students to collaborate in finding answers, students were empowered to find their voice within the solution, where articulation and debate of their preferences and remonstration the pros and cons to possible solutions and scenarios was an intrinsic part of the creative process. A teacher described this cross-disciplinary approach and the perceived benefits from allowing domains to synthesize:

> The students can bring their strengths and perspectives –one might be strong in geography, or maths, literature, music; a group of 5 can really scan multiple domains and perspectives- their strengths shine, and they bring out the strengths and inquisitiveness in others. This cross-disciplinary connectivity and approach to learning tends to promote divergent thinking, and connectivity between domains. (Singapore teacher 3).

This was concurred by another teacher stating:

> It can be a powerful way of transmitting knowledge by teaching concepts through competencies rather than strict subject delineation. Through arts and music we can teach structures, mathematics, science, literature and languages, and history. Taking the time to immerse students in this kind of critical mindset is important in developing fluid, malleable and creative thinkers. (Singapore teacher 2).

Teachers were willing to find opportunities to utilize multi-disciplinary connections, using student strengths to shape the flow of the activity. Whilst teachers teach for creativity, they also teach creatively in eliciting creative processes and actions from students. Allowing individual voices to emerge from group activity concurs with Howkins (2010, p. 66), who assures that, "collaboration doesn't obviate individual talent or ignore the light bulb' moment".

## Canada

Creativity was interpreted as an assessable outcome of student activity, whereby rubrics with continua for development of skills can be used. Some Canadian teachers were concerned with the concept of assessing creativity, expressing apprehension and concern over discouraging students taking risks and losing out if the activity did not work. Canadian teachers also described uses of student reflection as assessment, instilling reflection of students own processes, and products as they saw it. These teachers describe this significant change in approach:

> It's taken me a few years of teaching to be at ease with the curriculum demands, and relax more in the role of bringing out deeper learning in students. Creativity to me in my classroom means allowing students to understand the learning process and engaging students in the process, not just the beginning and the end. (Toronto teacher 2)

## USA

Teachers in the USA reflected on the pace of learning within their classes, stressing the significance of a mindful approach to teaching for creativity and critical thinking. Teachers expressed the awareness of slowing the learning dynamic and pacing the learning with more attention, focus and student-centred pedagogies. Some teachers felt comfortable utilizing this approach, adopting more 'in the moment' improvisational teaching practices that promoted critical thought (Sawyer 2011) constructively within classroom activities and assessment. Teachers expressed concern that assessments need not remain strictly individual, as creativity productivity was often enhanced by collaboration and interaction. Rubrics and performances were suggested as successful ways of assessing creativity because performances internally motivated students and rubrics explicitly guided kids to develop mastery and understanding of creativity concepts. Allowing students the opportunity to justify answers through reflection and self-assessment was also key to activating kids' agency/control of their own learning and hence their creativity. These thoughts by teachers capture nuances of their classroom dynamic:

> I encourage play and inquiry, and not being afraid to express thoughts to each other- not being afraid to be wrong and don't be afraid to try things new, so creativity to me is about exploration and learning from each others' processes and creativity, allowing a culture of curiosity to develop within learning. (NYC teacher 3)

> There's so many different ways to be creative, and curiosity is kind of the root of it all. It's always a process, sparking imaginations, an outlet of expression. (San Jose teacher 11)

> I can set a creativity task to 5 groups to do the same thing, and each group comes up with something different- making learning and creativity visible, and creating rubrics that enhance critical thinking by describing the processes and level of actions positively impacts on their self-efficacy of learning. Setting creative tasks for students allows them to be thoughtful, imaginative, proactive and responsive learners. (NYC Teacher 15)

> I encourage by starting with the kernel of an idea, discussing together how we can make the thinking clear and doable, something real; a dance, or a song, something physical that you touch or shape. I see it in art and maths, athletes, writing and how technology can manipulate and merge these domains and intertwine thoughts. (San Jose teacher 2)

Teachers found collaborative tasks as an effective medium through which inquisitiveness, exploration and dialogue engaged learners. This concurs with Gagné and McPherson's (2016) finding that 'the most central dynamic process is the active involvement of natural abilities as building blocks of systematically developed skills… and a dynamic view of talent and creativity development automatically implies constant interactions' (p. 10).

## Australia

Australian teacher participants expressed the desire to foster creativity through risk taking. Teachers expressed flow-on qualities and attributes that developed as a result of collaborative activities were greater confidence, resilience, self-reliance, and the ability to overcome a fear of failure. One teacher remarked:

> Allowing students to learn to grapple with scenarios and their thinking to problem-solve pushes their limits to experiencing failure along the way. Getting students to understand and feel comfortable knowing it's all right to fail, it's all right for something not to be that great, allows them the freedom to deeply explore possibilities. I think those are great skills that you can transfer into life as well (Australian teacher 11).

Australian teachers articulated a sense of grappling with a rigid system that maintains a separatedness of subjects—from teacher practice and application of creativity, to schools' organisational structures limiting staff collaboration and classes. Despite this, some respondents found ways of integrating interdisciplinary approaches:

> In our junior school we have a timetabled, stand-alone subject called "design in futures" that immerses students in design processes and concepts, and specifically attempts to combine a couple of curriculum areas simultaneously. This shows students the transferability of creativity not just specific to subjects, but nurtures creative thinking across subjects. (Australian teacher 56).

Some teachers were critical of the limitations imposed on practice. One teacher remarked, "the system is not changing *fast enough*—this school still tests for memory and not capability". One principal was of the view that "the biggest enhancement to learning was having their staff well educated in the area—creativity—so that it is understood universally, could be interpreted in parallel between various domains of learning, and flows 'naturally' into what they do". Some teachers expressed perhaps naïve assumptions of what multi-disciplinarity was, one teacher remarking: "there's a 'fluidity' between subject silos … there's lots of blending going on, like digital media will do things for math, and they'll write a story in English and then film it". An important aspect affecting the limits to creativity is that inexperienced teachers are unsure of creative interdisciplinary possibilities beyond simplistic interconnections.

Australian school teachers in this study expressed the notion of negotiating the promotion of creativity amidst highly risk-averse environments. Descriptions of constraint and creative impetus hampered by testing cultures was prevalent. Teachers expressed a desire for creative open-mindedness, and critically reflexivity

and utilizing creative pedagogies within constraining curricula and assessment. Teachers felt disinclined, unchallenged and unrewarded in pursuing inter-disciplinary methods. Despite this, teacher practices and pedagogies utilized cross and inter-disciplinary constructs that linked parallel ways of thinking and found inter-domain connections that enhanced lines of student inquiry.

## Experiences of creativity

Teachers described impactful moments that initiated creativity in the classroom. Teachers described encouragement of students to immerse in problem finding, using the teacher as a sounding board to enhance discoveries and experiences that initiate and sustain creative endeavours. Teachers found that they were effective when acting as creative agents in the classroom. Teacher behaviour beyond scaffolding techniques, actively modelling creative behaviours and enthusiastically coaching students to be a part of activities developed a collective, communal ethic of creativity and inquisitiveness. One participant shared the questioning process between students and teachers, articulating the inquisitive moments, the processes and the transformations that are part of the creativity:

> We ask, why do you do that, what is your purpose? Asking questions, and explaining my own thought processes is very important. We want to demonstrate by example what thinking involves, about being resilient to failure and even developing how individuals develop their own unique way of learning (Singapore teacher 3).

Evolving and asserting creativity in classrooms was perceived as responding to the needs and shortcomings apparent in compulsory education. Teachers allowed students to find their own connections between domains of learning that linked with their personal passions and dispositions and craft their work and assessment accordingly. Whilst some students' depth of inquiry may be through a cross-disciplinary connection, other students may have more finessed perceptions of applying interdisciplinary connectivity that allows both thinking and creativity to be comfortably exploratory, malleable and personal. By enhancing 'core' learning and standardised approaches to assessment and measurement, the following teacher reflection captures how individuals can adjust and determine their creative investigation and assessment that is both process and product oriented:

> I encouraged students to negotiate what their project would be. Once I equipped them with thinking what to do, I also equipped thein thinking how they could demonstrate this knowledge. I remember having one student who said, you know, I don't really need to write an essay or a critique. What I'd really love to do, is I would love to use the floor in here as a kind of media site, so when people walk in they're walking over words and images. (Toronto teacher 7).

Creativity can include using feelings as an entry point, an approach based on notions of 'understanding', empathy, and experience and one that moves beyond simple

'skills-based approaches' (despite creativity curricular definitions frequently still reflecting a 'skills and capacities' orientation). Gagne supports this view, suggesting that 'teacher–pupil fit is probably more important than a fixed teacher quality' (Gagné 1999, p. 14). Howkins (2010) further expands this stating that facilitators of creativity in classrooms "welcome (or at least tolerates) different histories, cultures, perspectives, beliefs, styles and languages, and accepts different ways of thinking and imagining". (p. 48) This example from a Drama teacher's guidance is an example of collaboration, imagination and empathic understandings:

> Certain concepts are difficult for kids, and levels of understanding are experiential. Discussing economic inflation for example, how would they know what inflation is? Showing them *how it feels* to be deprived of certain things and using drama to inhabit that feeling. A class business studies activity selling pizza to the highest bidder, so they offered banana notes (class fake money). The groups couldn't do it individually, but they collectivised, improvised and combined all the money so they all won out. We then discussed the politics and social connections of what happened – their creativity fed mine, and their learning covered finance, alliances, trust, loyalty, and social conscience. (Singapore teacher 5)

What is clear in considering how to enhance creativity in schools—particularly secondary schools—is that thinking and measuring what 'counts' and what represents 'success' must change. How teachers implement these wider abilities, aptitudes and creativities need to be organised less as ad-hoc activities, and more as pedagogically structured applications of cross- and trans-disciplinary approaches embedded in teacher practice.

## Enhancement of creativity/creative spaces

Teachers cultivate learning environments in which students feel safe and in which they have permission to explore, take risks and fail. This study shows that relationships between teacher and student are at the centre of safe and creative learning environments. The teacher experiences exemplify pedagogies used, the learning environments they tried to create and the school or institutional factors that affected creativity in their school. Some described the learning environment they strove to create as an 'incubation bed', with teachers as 'trainers' who mentored students and acted as role models. Participants described that it took time for students to learn to be creative, where initially some would wait for instructions. Patience and the need for time for students' confidence to develop was noted by a number of teachers. One participant put it: 'we go as fast as we can but as slow as we must' in evolving student learning from a competency mind-set, to that of a growth mindset.

Teacher discourse is evident as a significant nurturing creativity. Bakhtin (1981), asserts the utilization of a dialogic pedagogy in which the teacher can explore beyond learners' mere internalization of external abstract knowledge, and further develop convergence and divergence of creative thought that emphasizes multi-

directional development, diverse ideas and a multiplicity of perspectives (Matusov and Marjanovic-Shane 2014). Dialogue can enhance a student's importance of their own learning and creative processes, and their sense of individuality through relationships with teachers and collaborators (de Bruin 2016). A creative, dialogic teaching and learning dynamic can instigate and develop ideals and aims and assist students in developing intersubjective understandings towards one (Wegerif 2007). Alexander's (2004) notion of 'dialogic teaching' stimulates and extends students' thinking, learning and understanding, and enhances the way students and teachers conceive of knowledge. This teacher reflects on dialogue enhancing learning and creativity in the classroom:

> Talking through thinking with students builds the ability, knowledge and intuition to solve problems. Allowing students the time to discuss problems as they see it, can allow the student to find the connection. Stepping back, observing, thinking, distilling, and allowing students to express their thinking with each other allows students to consider other possibilities and perspectives in a comfortable environment. (Toronto teacher 2).

Teachers are often the driving forces and motivators in the classroom, empowering students to be curious, industrious and embrace possibility thinking. This teacher describes reflections of dialogue and a sharing of the creative space:

> Teacher's ability to think outside the box and improve the situation is an important skill, helping students come up with ideas that's unconventional and involves the students being more transformative. Letting go of the power in the classroom and allowing students to create multiple answers; allowing a changing paradigm in the classroom that fosters students' seeing beyond their established possibility of things. (USA teacher 12)

Teachers and school leaders were asked about 'hot spots' of creativity in the school (formal or informal), about atmospheres of trust, and the importance of relationships and the physical environment. Teachers felt the physical environment as a significant impact on creativity, articulating awareness of spaces that disaggregate students and discourage creative encounters (both outside and inside buildings). Teachers within a K-12 school saw the lack of boundaries in their school as giving energy and vitality, where pre-schoolers as well as Year 12s transited the same space. Others saw having a separate middle school as a great source of providing for the needs of this age group, creating a sense of community and belonging. Our belonging to communities is also a. Students were seen to benefit from belonging in communities of practice where peripheral participation evolves creative, social adaptation through mutualism and symbiosis (Lave and Wenger 1991).

Teachers found the importance of spaces that brought teachers together and facilitated the communication of ideas, and encouraging connections and relationships. Some schools devalued multi-skilled, multi-function environments whilst others were able to see a connection between creative spaces and pedagogies, expressed by this teacher:

> Spaces need to go hand-in-hand with building teacher capability. Buildings, while an element, are not the whole answer. You have to simultaneously shift the pedagogy of teachers, to more creative pedagogies, and connecting students with the spaces. (Australian teacher 19).

Thoughtful teacher interaction and connection to the environment and collaborators can promote activating students' strategies. Some teachers felt comfortable in creating a culture or a shared philosophy that supported the expectation that teachers will try new approaches, and that failure is part of the learning journey (i.e., 'it's OK to fail as long as you are trying and learning from it') (Moran 2009). Whether certain teachers were more or less inclined to develop these practices and pedagogies (subject orientation or confidence from experience) is beyond the scope of this study, the profound way teachers and administrators foster creative school environments is significant to its communal success. As Gagné asserts (1999), developing students' talents is 'facilitated or hindered by the action of two types of catalysts; interpersonal and environmental (p. 40). Such teacher behaviours, strategies and pedagogical approaches facilitate significant immersive learning environments, critical thinking and dispositions that foster a truly *creative ecology*.

## Impediments to creativity

Teachers articulated three main hindrances/criticisms of policy or institutional level organisation that hindered pursuing creative outcomes in classes. Teachers identified a 'crowded curriculum', onerous levels of oversight, and documentation and repetitive paperwork. Some teachers felt restricted due to the need to meet and confer with colleagues within their domain of learning, making impossible to find the time to develop cross subject affiliations. Some teacher's school experiences described practices that clearly implemented effective and thoughtful cross-, inter- and trans-disciplinary pedagogies. Descriptions of synthesizing disciplines captured a reorganizing of pedagogical approaches that enabled deeper learning experiences across science/technology/engineering/arts and maths domains (STEAM) by integrating learning fluidly and reciprocally across subjects. Despite worldwide notions of a crowded curricula, the data adds support to the ways arts can operate as a significant fulcrum through which wider domain learning and creativity is promoted (de Bruin and Harris 2017).

Teachers in Singapore asserted that curricular, cultural and testing constraints (including international moderation processes) were identified as policies that impacted on the development and support of creative practices and environments. Most Singaporean teachers identified standardised assessment as a major impediment, taking the position that despite the syllabus stipulating that there must be room for creativity and exploration, it is the assessment regimes (particularly national exams) that mitigate against creativity.

Canadian teachers felt curriculum policy in Canada was not seen as a constraint. Constraints perceived by teachers at the school/department/institutional level and included: control over teachers, timetable constraints, limited collegiality/cross

pollination, teacher resistance to creative collaboration, and lack of teacher flexibility/skills. This salient comment from an Ontario teacher captured a general feeling expressed by the Canadian cohort:

> In Ontario, we pay lip service to the importance of creativity and creative thinking, we invest wisely and differentiated instruction and workshopping teachers, and at the same time, we're moving in this data driven, quantitative, neo-liberal approach to measuring student outcomes. We talk a lot about creativity, but are moving very rapidly and aggressively toward more standardised testing. Our curriculum and our classrooms are opening up possibilities while the high stakes standardised tests are narrowing them. (Ontario teacher 22)

Teacher requirements for arbitrary assessment and measurability of learning was viewed as a barrier to creative practices in her class:

> Assessment has become so black and white. Teachers are held to account, and I teach this curriculum the prescribed way, thinking I don't know how this going to help them get a job in the real world." The workplace thinking is a stifling environment (Toronto teacher 63)

Most teachers in this study from the USA said policy-level influences, including the incoming Common Core was not a constraint on creativity; they saw creativity as being constrained by the qualities of the individual teacher. Institutional constraints did not figure much in the picture they drew (in contrast to Canada). However, standardised testing was universally seen as detrimental to teachers' and students' developing their own creativity because it is based on one right answer and discourages risk and the seeking of alternative solutions. This teacher expressed the vitality with which teachers embark on their profession in embracing creativity-enhancing practices, yet being eroded by non-creative requirements:

> I think that teachers start their careers with inspiration and creativity. I just think we kind of train it out of ourselves and each other (NYC teacher 59).

This contrasting view of teacher capabilities rebukes this stance, questioning teacher training practices:

> A lot of teachers themselves have not experienced creative learning and development of divergent thinking, so they are restricted in the ways they can understand and promote creativity in their classes (NYC teacher 15)

School curriculum restrictions were articulated as a strong impediment to creative practice, affecting the way teachers interacted with student work:

> There are way too many tests. I think we do need testing. I think it just needs to be done smarter (NYC teacher 6)

The way teachers were restricted in applying appropriate curriculum development and planning was also a barrier:

> Where I think creativity gets shut down is that as teachers we don't have time to conference or be collaborative with each other (NYC 24).

## Making secondary schools more creative

Teachers can apply a vast and effective range of pedagogies that enhance creativity. This study realized strategies that included differentiation, structure (task structure and relational structure), spaces/environments, real-world relevance, staff development and connectivity that includes cross-disciplinary partnerships and the role leadership can play in asserting creative practices and pedagogies in schools.

The breaking down of subject-specific knowledge, the encouraging of inquisitiveness, collaboration, and persistence that sparked imaginative thinking, and cross-disciplinary problem solving and divergent thinking are behaviours integral to promoting creativity. The ways teachers nurtured these qualities via pedagogical applications was an illuminating facet of this study, notably the possibilities rendered from inter-relationships between subject areas, the promotion of students' exploring these connections, and producing creative ways of exploring, discovering and presenting their knowledge. Multi-, inter- and trans-disciplinary learning situations were articulated by teachers as effective promoters of positive outcomes and student understandings of creativity despite not being an attributed aspect of curriculum design. This manifested practically through teachers employing strategies that encourage trust and professionalism of learning teams by locating staff together (usually a year level), working together and collaborating more easily and sharing information. Chrysostomou (2004) argues that such interdisciplinary approaches (at work, in school) provide the conditions for creativity more than any other single factor (Alves et al. 2007).

From the participants' reflections of creative experiences, it can be deduced from the larger cohort of American and Australian data that despite limited collaboration and time to discuss cross-pollination of ideas with other staff, these teachers through their own compulsion shared information and operated collegially to optimize creativity in their classrooms. Utilizing skills in interpreting curriculum guidelines, professionalism of ongoing learning, pedagogical improvement and adaptability, teachers—as creative practitioners themselves improvised within the margins of manoeuvrability to promote creativity *in* and *across* domains of learning (Sawyer 2006; Massumi 2008). The teachers articulated frustration from increasing standardisation of curriculum and assessments as well as some articulating a lack of administrative vision. Despite these challenges, the data captured teacher experiences of developing classroom cultures that rewarded risk-taking and experimentation, of organizing united segments-of-school approaches that valued creative cultures, supported shared philosophies of *teachers* taking risks and pursued these teaching and learning traits by enhancing creativity through interconnection of domains and inter-disciplinary pedagogies.

These teacher reflections offer implications to the ways education organises and conceives twenty-first century learning and teaching. Professional teaching as a profession must seriously consider the acquiring of knowledge pertaining to

creativity and how teachers can foster it in their students. Schools need to establish growth mind-sets for creativity in teachers, and teacher-training institutions likewise in its graduates, and equip teachers as lifelong learners, instigators, and powerful inspirers of creativity. Curriculum design in teacher training thus needs "to engage academic teachers with creativity as a hard-edged professional capacity that can and should be fostered through higher education teaching and assessment" (McWilliam and Dawson 2007, p .4).

By investigating arts, music, maths and science classes, this study offers practical applications that may unravel conceptual confusions, issues and debates that offer resistance to cross-, trans- and inter-disciplinary pedagogies. This assertion supports the British Educational Research Association Research Commissions (Colucci-Gray et al. 2017) findings that observe a conflating of STEAM with creative approaches to teaching in the STEM subject areas—significantly recognized as distinctly and crucially different. Evidencing secondary education teacher practices configured towards multi-disciplinary practices also compels the need for further inquiry into the ways STEM and/or STEAM education initiatives based on collaboration, dialogue, environment can effectively impart knowledge and skills with critical and creativity education at its core.

## Creativity of schools: Assessing and measuring

Whilst schools and places of teacher training can increase the levels of creativity learning, schools need to reflect and self-assess the ways in which they inspire and develop creativity within their communities. The study proposes that whilst Governmental policy continues to fibrillate on the issue of creativity, schools need to adopt proactive initiatives that improve creative and critical thinking practices and hone specific pedagogical strategies teachers and administrators can use to create emergent creative environments, classes and mindsets.

The descriptions from the teachers in this study evince the need for teachers and schools to assess their own experiential situations, and explore, identify and quantify various natures and extents to which creativities within their communities exist. Schools can engage in strategies that can formatively evaluate and maximize creative learning and teaching in schools. By establishing and nurturing an open, supporting and dialogic environment, schools can promote critical reflection of teacher direction toward understanding creativity, the effective pedagogical approaches that promote creative thinking, and the designerly ways teachers can integrate inter-disciplinarily and cross-curricular collaborative teaching that promotes creativity. Teacher self-evaluations of the ways they themselves bring creative dispositions to the classroom, and how their modelling, scaffolding and coaching within the class, and beyond the class with external partnerships/industry can enhance authentic, real-world possibilities and maximize the creative potential in all students is urged. Utilizing ongoing professional development, school leaders should commit to ongoing development serving the following three core foci:

Focus 1—Creative environments
Focus 2—assessing Creative processes and products
Focus 3—Creative Industry partnerships (Harris 2016, p. 118).

This allows for the rationalization of school wide reflective processes that make creativity observable, teachable, and assessable. Schools can judge observations against an informed catalogue of descriptors, that can inform schools of processes and actions that can enhance creativity within their school communities. These foci establish a cognitive architecture through which schools and teachers can begin to establish a creative landscape. A more in-depth and detailed school analysis might consider internal and external policy pressures, individual and collective professional development of teachers, and the extent to which they consider and engage in thinking, doing and being creative. School administration and staff should evaluate the extent to which they value creativity, and afford consideration to the nurturing processes and skills of teachers individually, collectively, and investigate interdisciplinary possibilities across subjects.

Schools can better understand and act upon their own localized contexts and understand unique subjectivities pertaining to their school environment. Schools as contextually constructed entities require an instrument that can holistically make clear evaluations that can align strategic planning and development to maximize creativity within their environments, and what they can offer students. The Whole School Creativity Audit ("Appendix 2") provides one consistent and measurable tool that can assist schools or policy-makers to comprehensively address their school's unique ecology toward creativities education, and assist in carefully mapping out schools' strengths, shortcomings, and pathways for future success.

## Conclusion

The assent of creativity and critical thinking as a student capability within Australia and abroad (ACARA 2017) compels education policy and teaching to critically and creatively respond. Professional teachers and pre-service teacher education courses grapple with how best to train and become effective teachers in and of creativity, marking a unique point forward in how we go about more expansive educational change. As Government initiatives direct significant resources towards STEM education and connections with industry, questions over effective implementation remain. What constitutes an appropriate blend of science, technology, mathematics and engineering, how is an integration of ideas and pedagogies synthesized with content knowledge, and how is this taught through a balance of specialist teaching? Is education more aptly taught through pedagogically interconnected lenses of inquiry that allows complexity and likeness to be demonstrated through interdisciplinary practices? Whilst the arts bring kinaesthetic, emotional and entrepreneurial qualities to teaching and learning how are the aforementioned dilemmas better solved by the integration of arts through STEAM, and how will this facilitate effective learning outcomes that are indeed not subject specific and that require far more sophisticated assessments than what national testing provides?

The world-wide re-evaluation of making imperative creative practices in teaching and learning can be further advanced and focused by school situated creativity assessments that this study offers. By examining experiences, environments and present ecologies that facilitate and impede creativity, this study reveals that applying and improving creative and critical thinking in secondary schools is a complex one. Whilst negotiating impediments to creativity in our classrooms, teachers developmental understanding and comprehension of creative processes and products may well be the lesser impediment than fearful mind-sets held by teachers, school administrators and policy shapers. Overcoming education's fear of failure may well make our classrooms the most creative places on earth—our classrooms are already becoming complex laboratories, they need not be risk-averse ones.

This study highlights characteristics of the conditions, environments and practices teachers address in making creativity emerge from student minds. This study evinces that in nurturing and developing creativity, teachers, administrators and schools must approach creativity within education by developing:

- an interdisciplinary transferral of competences,
- multi-literacy between domains of learning,
- multidisciplinary learning modules within *critically* networked spaces,
- connectivity between school creativities and adaptive, innovative workplaces, and enhancing creative learning and living within and beyond school
- teacher education and professional development that enhances creative and interdisciplinary knowledge and pedagogies.

Effective and informed pedagogical applications by teachers in the classroom can generate positive influence and outcomes to promoting creative climates. Creative relationships between teachers and learners are dependent on the nurturing and promotive aspects of interactions and activities that can potentially fracture the siloed nature of subjects and predominant teaching practices. Learning and teaching that reinforces effective pedagogic environments can promote high expectations, mutual respect, modelling of creative attitudes, flexibility and enhanced dialogue interactions, and indeed creativity.

By interweaving educational creativity theory with creative industries systems approaches, an environmentally based 'creative ecologies approach' can facilitate multi-disciplinary perspectives that enhance creativity in secondary schools. In doing so, this study qualitatively evinces teachers' experiences of transferability of creativity in and between domains of learning into other subjects, linking explicit creativity to academic achievement (Catterall 2009). This study can facilitate secondary schools finding ways to make more room for creative risk, innovation and imagination, and adequately prepare students for creative workplaces and society. Whilst further substantive study of creativity in schools is essential, this international focus, development of new methodological approaches for understanding, critically situating and assessing for creativity in schools is a significant step forward.

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**Compliance with ethical standards**

**Conflict of interest** The authors declare that they have no conflict of interest.

## Appendix 1: Focus group questionnaire

1. How do you develop creativity in your students?
2. What pedagogies work best for you in developing creative behaviours in your classes?
3. What collegial discussions do you have to develop pedagogies that facilitate creativity?
4. Do you find it difficult to establish/develop/ignite creative behaviours in students?
5. What hot-spots are there in your school that you think promote creativity?
6. How does creativity manifest in your students work?
7. What actions with other teachers do you do to promote creativity?
8. Describe the collaboration that occurs in working with other staff to bring subjects together?
9. What inhibits you from fulfilling creative outcomes in your classrooms?
10. Do you think you are creative?

## Appendix 2: Whole School Creativity Audit

| | | |
|---|---|---|
| *School policies and practices* | | |
| External policies | | |
| 1.1 | Are we aware of the national economic and education policies that address creative education? | Yes/No/ Review |
| 1.2 | Are we aware of the state-based policies and initiatives that support creative education? | |
| 1.3 | Are we aware of the ways in which the national curriculum or department of education in our district addresses creativity in education? | |
| 1.4 | Do we effectively share these documents and visions with our students and staff? | |
| Internal policies | | |
| 1.5 | Do we actively pursue ongoing development of internal evaluations of our creative capacities, rather than defer to external requirements? | |
| 1.6 | Do our creativity policies and structures reflect the uniqueness of our community and place? | |
| 1.7 | Do our students and staff have input into our creative strategies? | |

Teacher professional development

1.8 Do we demonstrate a commitment to creativity by proactively and universally offering creativity PD to all staff and students?

1.9 Do we recognize creativity as a skill that must and can be developed, reflected in our PD program?

Whole-school creative practices

1.10 Do we actively program whole-school activities that foreground creativity as artistry or innovation?

1.11 Do we have (or are we working toward) commitment to improving our creative skills and capacities as a learning community, including the leadership of the school?

*The product (curriculum, assessment, timetabling)*

Individual creativity

2.1 Do we actively reward setting creative outcomes across the curriculum?

2.2 Do all teachers in our community share equally in offering more creative modes of student demonstration of knowledge, and incorporating assessment criteria that assess the creativity component of all student work?

2.3 Do our school leaders prioritise creative education here by adjusting the timetable to allow both students and staff time for practicing creative skills and capacities including: curriculum innovation, cognitive creative exercises and games, tolerance for ambiguity, peer- and student-led brainstorming and information-sharing?

Collective creativity

2.4 Do we reinforce the notion that creativity is nurtured in collaborative and collective endeavour?

2.5 Do we provide opportunities for students and staff to work collectively in creative ways?

2.6 Do we value the outputs of collective creativity in our school community, rather than ignore or discard the outputs?

Thinking creatively

2.7 Do we provide opportunities for our students and staff to demonstrate their creativity in class or outside of class time?

2.8 Do creative products and efforts receive as much academic status or value in our community as other subjects and outputs do?

2.9 Do we actively articulate the belief that creativity is a thinking capacity, and is not the same as artistic ability?

Doing creativity

2.10 Do we provide opportunities for our students and staff to demonstrate their creativity in class or outside of class time?

2.11 Do students and staff ALL have opportunities (and an obligation) to practice creative thinking, doing and sharing in our school?

2.12 Is creative endeavour reinforced as a core component of academic success at this school, not just a ‘time out’ of serious academic work?

*The process*

Individual creativity

3.1 Do we actively work against test-like activities as often as possible, knowing this inhibits creative thinking?

| | | |
|---|---|---|
| 3.2 | Do we actively work toward re-balancing our assessment structures toward measuring process rather than product? | |
| 3.3 | Do we prioritise collectivity and collaboration? | |
| Collective creativity | | |
| 3.4 | Do we prioritise collectivity and collaboration in our timetable? | |
| 3.5 | Are we committed to timetable changes to enhance opportunities for collective creativity? | |
| 3.6 | Do we reward collective-developed original and innovative work at our school? | |
| Thinking creatively | | |
| 3.7 | Do we encourage thinking creatively as a crucial skill for all students and staff? | |
| 3.8 | Do we reinforce the tangible value of process over product in the creative lifecycle? | |
| 3.9 | Do we explicitly teach creative thinking as part of all subject areas? | |
| Doing creativity | | |
| 3.10 | Do we actively program whole-school activities that foreground creativity as artistry or innovation? | |
| 3.11 | Do we allow students to demonstrate creative thinking in non-arts-based areas of enquiry? | |
| 3.12 | Do we explicitly reward creative innovation as a workplace skill that this school champions? | |

| | | |
|---|---|---|
| *The school environment* | | |
| In relationship with students | | |
| 4.1 | Are we prepared to give students more autonomy, emphasizing the need for self-discovery as a core creative skill, even as it impacts a change in the timetable, bells, or student movements throughout our school? | Yes/No/ Review |
| 4.2 | Do we reinforce the importance of communication in creative idea-sharing? | |
| 4.3 | Do we actively reinforce the importance of risk-taking and nonconformity in problem-solving, for both academic, creative and real-world successes? | |
| In relationship with staff | | |
| 4.4 | Do we make opportunities for staff to intermingle, talk informally, and share ideas? | |
| 4.5 | Do staff feel a sense of control and autonomy in their work? | |
| 4.6 | Do we encourage curiosity in our staff, or compliance? | |
| The physical environment | | |
| 4.7 | Does the school site clearly provide collaborative spaces? | |
| 4.8 | Does the school site encourage both individual and collaborative brainstorming? | |
| 4.9 | Does the school layout work actively against centralizing the standardised subjects and marginalizing the creative subjects and practices? | |
| 4.10. | Does the school work to integrate a range of environments (e.g. outdoor, indoor, quiet, interactive)? | |

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