



The Creativity Revolution and 21st Century Learning

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Our hearts ache with the loss of Sir Ken Robinson, (1950-2020) after an extraordinary life as one of the world's leading educationalists and thinkers on creativity and innovation. The world has lost a giant with Sir Ken Robinson's passing. Sir Ken Robinson was to education, what Steve Jobs was to technology, and what Stephen Hawking was to physics and cosmology. Sir Ken Robinson, a great educationalist with a deep sense of humanity, an entertaining wit, and massive charm, was one of the world's elite thinkers on creativity and innovation. Sir Ken shared his understandings so that we might all become better educators. Sir Ken Robinson led us and taught us, encouraging us to use his ideas to revolutionise our teaching for the betterment of the next generation. The world has lost an extraordinary man. This paper discusses the views and the importance of creativity as espoused by Sir Ken Robinson and others. It further suggests how this education revolution could be implemented and promoted with 21st century learning skills within the various secondary schools.

Keywords: *Innovation, Creativity, Education revolution, 21st century learning, problem-based learning*

Introduction

The famed psychologist Carl Jung (1875-1961), who proposed and developed the concepts of extraverted and introverted personality archetypes and the collective unconscious, explained in his 2014 *Collective Works* (2, pp121-125) that being born is a miracle, states that we each have the free will to decide whether we are going to waste our lives or do something interesting with the greatest influences being the family, socio-economic influences and opportunity, but it is the individual's education that will have the most significant impact. Jung (2:p132) explains that for most people their true passions often lay outside of their physical and mental capabilities. That is why humans frequently entertain themselves with meaningless escapism,



but ultimately, we are all the authors of our own fate. If we were clear headed, we could reconstruct situations to make them better suit our needs.

This makes us consider if individuals were placed in the thick of intellectual learning in schools with resources that inspired and motivated them, how their motivation and understandings would change. If learning in schools was individualised as Robinson (2014) states in *Transforming Education*, 84-86 we must consider whether one's limits of our knowledge would change. As Jung in his 2014 collective works (2:p164) explained, "when you are in your element" and this applied to learning, "you can be physically exhausted, but spiritually uplifted." That sense of euphoria and achievement at things in this realm and this will lead us to a successful pathway of our choice.

Sir Ken Robinson (2007) discusses the school of life, telling us that everyone is born with extraordinary capability; this capability presents itself in different ways in each individual, but we are all filled with it. This becomes an idea that he reinforced throughout his academic life. He repeatedly claimed that it is the individual's responsibility to decide what to do with this capability. Each person has to decide whether to develop their capabilities actively grow to learn and achieve greater things, to rest on their laurels and passively rest on what they know, or ignore and reject their capabilities, instead choosing not to learn and move forward in understandings. Each person needs to act responsibly and consider what happens to all that talent as they progress through life. Individuals differ, many are learning, moving forward, and achieving in their chosen pathway, whilst others are just getting by, never realizing their true potential. Parents and teachers, as educators, have an enormous impact on a child's development.

Sir Ken Robinson (2017b) tells us that "Education is of the utmost importance to society" because it allows us to build a curiosity and creativity in children which may lead to individual fulfillment, to problem solving on a personal, community or global level and because it builds creativity and innovation. For this reason teachers are challenged to transform our education system by building personal relationships and developing the appetite and curiosity of learners because "when the conditions are right, miracles happen everywhere."(p162) We are asked to consider that education is a deeply personal matter, and a transformation occurs when the individualised conditions are suitable miracles happens in children's learning. Fontana (2017) supports this by stating that individuals live a different and individualised educational experience throughout schooling and the impact of this process has lifelong effects that determine not only what they know, who they are, how they achieve in various areas but also how they will interact with others and in society. Collins (2019) also agrees, stating "Their educational experience may determine their entire life-long direction".

These prolific academics (Collins, 2019; Fontana, 2017; Robinson, 2017a) agree that building relationships, rapport, and trust with each student in the class occurs in different ways for each



person. Building these relationships with the children that we teach allows transformation of students to occur. The point being that teachers should not teach their classes, the need to know the individual students and reach each one of them. The authors of this paper support this notion that a teachers' job is not to preach when they teach or provide masses of information for processing as students now have fingertip access to content through search engines on mobile technology, but to provide the students with the motivation and opportunity to create and build their own learning experiences through creative endeavour. Teacher's assist students to learn by individualising the learning experiences, allowing the students to focus on their interests and strengths and build on what they know, thereby extending their zone of proximal development (Vygotsky p278-281, in del Rio & Alvarez, 2007).”

If the school of life is the greatest school ever (Hargreaves and Fullan 2020), teachers must consider how classrooms can be changed to reflect the school of life where each student follows individualised pathways. Teachers need to cater for the individual as opposed to a class to allow each child to become the best that they can be-a doctor, a researcher, an academic, a politician, an artist, a musician, a parent in their chosen pathway.

It is the teacher's role to be the change you want to see occur (Karisson, 2019). If the teacher can share a sense of excitement and passion and learning, this will impart to the mentee students a goal of empowerment as they determine the direction, the depth, breadth, and holistic approach to their learning whilst concurrently viewing their role model teacher as being credible in their teaching and learning role, allowing the students to see what is possible for them to achieve. The most distinctive feature to be used in the cognitive development of students in schools, is the ability to imagine (Crane, 2017). Creativity is at the heart of an educated person, a civilized person because creativity invokes higher order thinking by provoking and inspiring curiosity.

Parts of our thinking, left to itself, is distorted, partial or uninformed, yet the quality of our life and that of which we produce, make, or build depends precisely on the quality of our thought.” Critical thinking is therefore the foundation of a strong education (Huitt, 2011). Critical thinking is a higher-order thinking skill. Higher-order thinking skills go beyond basic observation of facts and memorization. They are what we are talking about when we want our students to be evaluative, creative, and innovative. Using Bloom's Taxonomy of thinking skills, the goal is to move students from lower- to higher-order thinking: from knowledge (information gathering) to comprehension (confirming), from application (making use of knowledge) to analysis (taking information apart) and from evaluation (judging the outcome) to synthesis (putting information together) and creative generation. This does not have to be a linear process but can move back and forth, and skip steps. This use of creativity and critical thinking can and should be used in and to join all school subjects because creative work has numerous outcomes that cannot be assessed within our current education system. So, let us consider what exactly is creativity is and why is it so important to use in education systems.

What is creativity?

The idea that creativity defies definition, and yet is recognizable, speaks to the ineffable yet self-evident magic that seems to underlie the creative spark (Mishra, Henriksen & the Deep-Play Research Group, 2013). Creativity has long been recognized as a powerful force in shaping human society and driving progress and knowledge. Victor Hugo (1852), the French novelist and poet, once noted, “An invasion of armies can be resisted, but not an idea whose time has come. It is time for the creativity revolution!”. In order to really understand what creativity means, and how it functions within a discipline such as education, it is important to develop a meaningful definition.

Sir Ken Robinson (2019) continues to lead this daring revolution to change how we understand schools, learning, and the passion and talent of our students. He was a leader, a change-maker, for forty years, and he persuasively made a case for more creativity in teaching and the curriculum. Sir Ken Robinson developed a deceptively simple definition of creativity, stating: “Creativity is the process of having original ideas that have value”. (Sir Ken Robinson, 2019b). Contrary to common misconceptions, creativity is not something only saved for those who are talented or born creative. Creativity is innate to the human species (Robinson & Aronica, 2019a). All children are born curious and highly creative; however, this skill is not fostered within our school system as it is not as valued as literacy or numeracy (Robinson and Aronica, 2019a). Anything that involves intelligence can involve creativity. Robinson (2019c) explains that education authorities often use the three terms: imagination, creativity, and innovation, interchangeably. Robinson and Aronica, 2019a differentiate between them.

“1. Imagination is a wellspring of creativity. It is stimulating and uses past and existing ideas to promote thinking that hypothesises, speculates, and anticipates.

2. Creativity is applied imagination, allowing outcomes to be achieved.

3. Innovation is putting good ideas into practice, and it is judged by its creative value.”

Creativity is a process. It is the “process of having original ideas that have value” (Sir Ken Robinson, 2019b). It is a process of putting your imagination to work. This process sometimes comes quickly and, upon other occasions, develops over extended periods of time. This process must involve original thinking to you, and it must be of value to someone. If it is of value to someone, others will value it also. It is important to note that all creative processes involve evaluation, making judgements, and discerning from all different possible outcomes to come up with a final solution. This generation of creativity provides students with the skills and motivation to become innovative producers of goods, services, and ideas.

In 2015, the then Prime Minister of the United Kingdom, Mr. Tony Blair, worked closely with Sir Ken Robinson to reform education. There was a major focus placed on the development of literacy, numeracy, and creativity, with technacy having a place in the educational reforms. Sir Ken Robinson (2016) clearly stated that creativity was just as essential, and on occasions, more

important than literacy and numeracy. In Australia, there is a strong literacy, numeracy and technacy focus but the much-needed creativity revolution is yet to be seen. Why doesn't every country have an overbearing education strategy that includes creativity? Perhaps it has not been made a focus because of a misinterpretation of what creativity actually is and the inherent difficulty in teaching it, fostering it, and assessing it.

Creativity Myths

There are several myths surrounding creativity discussed and dispelled by Robinson and Aronica, 2019a.

Myth 1. Creativity is about special things.

Misconception: Creativity is not about being artistic; it is about developing the way we think so that we can solve problems in unique ways. We must learn to analyse issues from many directions in order to build our understandings before researching existing solutions and testing and experimenting, developing prototypes and synthesise solutions to problems. Of course, ongoing evaluation is required throughout the entire process.

Myth 2. Only some people are creative.

Misconception: We are born with untapped potential. We all have potential, and each of us must decide what we are interested in, where our strengths lie, how we can develop it further and achieve that potential.

Myth 3: Creativity is all about freedom.

Misconception: It is actually the antithesis of this; creativity involves perfecting skills, discarding thoughts, and hypothetical scenarios. This process takes time, hard work, much practice, and discipline in order to perfect the craft, even the craft of thinking.

Myth 4. Creativity cannot be taught.

Misconception: In order to allow creativity to grow in individual children in our classrooms, we must provide the conditions for curiosity to grow, we must share and use the creativity process, allowing students to work collaboratively on problems that encourage higher-order or critical thinking, discipline, and risk-taking. We must allow time and provide opportunities for students to develop these skills. We must provide different venues to awake and foster creativity, as not all students will respond to the same method of creative stimulation.

The importance of Creativity

This is a wake-up call to the emerging global human resources crisis. Increasing boredom, disengagement, and dropouts among students have become chronic aspects of many school systems around the world. Creative schools are a must for anyone who is interested in critique, vision, and theory of change for the new course of schooling because living in an age of communication means that schools need to lead children raised on gaming, virtual reality and second life where they live a different realm.



Creativity has value in business; its ubiquity in children, its perceived absence in many adults, and the phenomenon through which it disappears offers a ground-breaking approach for getting it back. Sir Ken Robinson (2017a) argues that organisations everywhere are struggling to overcome the perceived loss of creativity that he claims occurs when attending schools and universities. Industry, the workplace, and organisations everywhere are competing in a world of constant change; they need people who are flexible, can adapt and are creative enough to find novel solutions to problems old and new.

Research in 2017 by UC Berkeley psychologists suggests that creativity generally tends to decline as we age. Through a series of experiments, it was found that adults resorted to less creative thought processes than children. For many children, their creativity will reach its peak before the age of six, after which it will begin to decline with the onset of formal schooling and the developmental drive towards conformity. This means that teachers may have a lower level of creativity than the children they teach. Individuals do not lose their creativity, but you can lose touch with it. Sometimes one loses their ability to connect with it. The creative process involves critical thinking and problem-solving skills. Creative individuals generally go through five steps to bring their ideas to fruition—preparation, incubation, illumination, evaluation, and verification. A design process is commonly taught in schools to build creativity and critical thinking in students.

Schools, businesses, and communities work together to focus on one's individual creativity and realise its inherent value at every stage of life. The use of new, modern, and changing technologies will demand the use of creativity in everyday life. While education and training are the keys to the future, they can also lock people out of their own creativity by forcing conformity to common ideals and thinking. Only by actively fostering creativity can businesses unlock those doors and achieve their true potential.

It is important that educationalists understand the importance of actively promoting creativity and innovation because the advantages of exploring ways in which we can work together to keep creativity alive for everyone are many. Modern business demands creativity of thought and action and is serious about finding solutions to the fast-paced complexity of the modern world.

The Creative Process

In an interview held by Richardson, Henriksen, Mishra, P. & The Deep-Play Research Group, (2017) Dr. Yong Zhao's research shows that the first aspect of creativity revolves around cognitive ability—it is an ability of the mind to combine existing things and come up with something novel. At this level, creativity is about how we think in ways that lead to something new or original. That said, the ability to enact this cognitive ability in the real world requires the courage to create, involving having an open-minded attitude as well as a willingness to

confront challenges, uncertainty, and emotional vulnerability. This is the disposition that allows an individual to take risks in order to fulfill the desire to come up with novel solutions to existing problems. It is this emotional aspect of courage that drives forward the creation process. The third and final component of creativity is its social value. It is not only the ability to create and the desire to create that is important but the quality and value of the work itself. For something to be considered creative, it must have value to others beyond oneself.

Kaufman (2016) asserts that creativity lies in the interaction between the individual, the domain, and the field, in which the creative work is couched. The ability to create has become easier, putting the tools for the creation of new things in more hands more readily (Richardson, Henriksen, Mishra, & The Deep-Play Research Group, 2017).

To create environments that encourage creativity, Banaji and Burn (2017) list multiple actions that can be taken. Students and teachers need physical and mental space to play without a fear of an external judgment of their work. This requires working to shift the mindset of children, but also the training of teachers in how to provide this space for students to work. Banaji and Burn (2017) explain that schools need to value students' existing knowledge from contexts outside of the school and classroom. These are the narratives and types of knowledge that have been historically silenced in formal education systems yet are critical to challenging the existing status quo. By honouring teachers' and students' languages, cultures, experiences and explicitly showing true valuing of their rich diversity, schools can help students develop the skills needed to promote independence and confidence. Schools can encourage time for reflection and discussion while also continually working to connect emotion and intellect to aid in their development of their creativity and critical thought. The school day would need moments of controlled chaos; this would allow for play and laughter, as well of moments of allowing the mind to take a rest and opportunities for coping with the unexpected. Enacting all of these recommendations in concert would help to transform schools from an environment that reinforces existing power structures to one that challenges those structures and empowers students and teachers (Banaji and Burn, 2017).

The Creativity Resistance Revolution

While many teachers worldwide strive to give their students a thorough grounding in their disciplines, and some are outstanding in their innovations, Livingstone, Nandi, Banaji, and Stoilova (2018) have found many aspects of these systems to not only be lacking in their capacity for developing creativity but suggests that they are actively aimed to discourage thinking and encourage conformity. Livingstone et al. (2018) take issue with the way in which many modern educational structures do not allow for the use of extended time, often focusing education on goals that reinforce existing power structures of age, gender, ability, race, and economics. This focus, on how creativity in the classroom is at odds with elitist views of society, is central to the critical lens applied to education systems.

By allowing for the expression of students' experiences that are often meaningful in their own lives, if not in society more broadly there is a resistance to the idea that education is about purely instrumental goals, such as careers or wealth-making. Creating an environment that encourages this expression is important and best summed up by the statement, "creativity has the potential to be a solution to unhappiness, social inequality, war, and mental illness" (Livingstone, et.al, 2018). The conditions which allow for creativity could potentially reduce unhappiness, social inequality, war, and mental illness or, at the very least, lower anxiety, stress, unhelpful competitiveness, fear, and distrust. Creativity plays a role in these goals by allowing students the time to consider the problems presented to them in their daily lives, to search for explanations for their occurrence, and weigh possible solutions. A commitment to respecting their varied backgrounds allows students to intersect with each other's needs and lived experiences, not merely seek a shared common history to comply with or a common identity to celebrate (Livingstone, et.al. 2018).

Measuring and Evaluating Creativity

In an interview performed by Richardson et. al. (2017), Dr Yong Zhao, when discussing the findings of his research stated, "I have come to appreciate creativity as the foundation of human behaviour and human learning, every area, educational policy, language learning, global competency—all involve a form of creativity." The authors suggest that creativity can connect broadly with, and be judged within, multiple domains including Novelty, Purpose, Effectiveness, Task Appropriateness or Style and Wholeness.

At the most general level, a creative idea or product is novel, it brings innovation to the world that did not exist before. These innovations are often described as being original, however, being novel alone does not make something creative. Novelty must be connected to purpose. A novel idea with no potential use cannot be taken as "creative" (Frederiksen and Knudsen, 2017). Being novel does not guarantee that something will be effective (Good & Lavigne, 2018). Mishra and Henriksen (2017) and Babbot (2016) suggest that though these two attributes (novelty and effectiveness) are necessary, they are not sufficient. Another key characteristic is task appropriateness, it may also be referred to as style. Related to the style context are creative ideas, thinking and products. For instance, a creatively constructed mathematical proof, or an ingeniously designed science experiment, are both qualitatively and quantitatively different; and are dissimilar to other fields like music, art, and teaching (Mehta, Henriksen, & Mishra, 2020). So, when evaluating one's creativity must also account for this contextual dimension, the style of the product. Creative solutions often go beyond mere novelty and functionality to include a strong aesthetic quality. It is suggested by Han, Forbes, and Schafer (2019) that "wholeness", which involves the aesthetic dimensions of work, as situated with that work's specific context. A creative solution is new, i.e., it is Novel, Effective and Whole or creativity is a goal-driven process of developing solutions that are Novel, Effective and Whole" (Mehta, Henriksen, & Mishra, 2020).



Creative products could be evaluated through the use of contextual, flexible rubrics. Although an element of subjectivity will always be included, there is a need to have some anchor points covering novelty, purpose, effectiveness, style, and wholeness as this will provide more consistency with fair, systematic, and comprehensive assessment. The Deep-Play Research group (2020) in the Michigan State University College of Education, have been engaged in the development of a rubric (Mehta, et.al. 2020). This rubric, developed for research purposes, was part of an empirical examination of student creativity in an educational technology course called Creativity in Teaching and Learning, where students develop their own artifacts for teaching subject matter. The rubric effectively provided evaluation guidelines along the dimensions of Novelty, Effectiveness, and Wholeness. Artifacts were given a score between 1 and 5 for each of these dimensions. The rubric effectively grades the creativity displayed in the students' work.

Dr. Gray's findings, as stated by Mehta et al. (2020), explain that feedback plays an important role in creativity. It should be a different kind of feedback than offering a grade or a judgement. It needs to be feedback that is organic to the free-flowing creative process, that seeks to engage rather than critique, and it is critically important. Dr. Gray (2020) espouses the view that the more you centralize education, the more uniform it becomes, and the orientation is towards how kids do on tests, which removes creativity. Gray (2020) explains that as a society, we do not want everybody to be the same. We need people inventors, people who are collectors, people who are sticklers to the rules, and some who have wild imaginations...

21st century learning

Knowledge and skills are important to the future of our economies. Employment rates are higher among people with more education than among those with less. Education is generally good insurance against unemployment, even in difficult economic times. On average across OECD countries, employment rates for men and women with tertiary education have consistently been higher than for those without (OECD, 2021). This has continued to be the case during the covid19 crisis, from a job's perspective, it pays to study. The case for 21st century learning goes deeper than this and is more abstract. It is about how knowledge is generated and applied, about shifts in ways of doing business, of managing the workplace or linking producers and consumers and becoming quite a different student from the kind that dominated the 20th century (Fullan, Quinn & McEachen, 2018) and what we learn, the way we learn it, why we learn it and how we are taught it is changing (Schleicher, 2019). This has implications for schools and higher-level education, as well as for lifelong learning.

In 2020, we live in a fast-changing world. Today, because of rapid economic and social change, schools have to prepare students for jobs that have not yet been created, technologies that have not yet been invented and problems that we don't yet know will arise (Schleicher, 2019). We must foster motivated, dedicated learners, and prepare them to overcome the unforeseen

challenges of tomorrow. The dilemma for educators is that routine cognitive skills, the skills that are easiest to teach and easiest to test, are also the skills that are easiest to digitize, automate or outsource (Mishra & Kereluik, 2017). There is no question that state-of-the-art skills in particular disciplines will always remain important. However, educational success is no longer about reproducing content knowledge, but about extrapolating from what we know and applying that knowledge to novel situations.

Education today is much more about ways of thinking which involve creative and critical approaches to problem-solving and decision-making. It is also about ways of working, including communication and collaboration, as well as the tools they require, such as the capacity to recognise and exploit the potential of new technologies, or indeed, to avert their risks (Mishra & Kereluik, 2017). And last but not least, education is about the capacity to live in a multi-faceted world as an active and engaged citizen. It demands open-mindedness, making connections between ideas that previously seemed unrelated, and becoming familiar with knowledge in other fields (Mishra & Kereluik, 2017).

If we spend our whole lives in the silo of a single discipline, we cannot develop the imaginative skills to connect the dots. Today, literacy is about managing non-linear information structures. Consider the internet, the more content knowledge we can search and access on the web, the more important the capacity to make sense out of this content becomes. Rather than just learning to read, 21st century literacy is about reading to learn and developing the capacity and motivation to identify, understand, interpret, create, and communicate knowledge (Mishra & Kereluik 2017).

The knowledge world is no longer divided between specialists and generalists. A new group called “versatilists” has emerged (Schleicher, 2019). They apply depth of skill to a progressively widening scope of situations and experiences, gaining new competencies, building relationships, and assuming new roles. They are capable not only of constantly adapting, but also constantly learning and growing in a fast-changing world (Schleicher, 2019).

Teachers play the main role in determining the outcomes of 21st century learning. Teachers’ perception and understanding towards innovation in education influence their action, decisions, and practice in the classroom. Teachers are the main factor that contribute to students mastering 21st century skills which consist of 1. Creativity, 2. communication, 3. Collaboration and 4 critical thinking skills. The findings show that teacher readiness in implementing 21st century learning is high with master’s students showing a higher degree of readiness than teachers with a degree (Mohd-Rusdin, 2018).

Practical ways to build creativity in secondary classrooms

Finding and forging the individual talent students innately possess should be one of the main goals for educators. Building a genuine relationship with each student would allow teachers to be able to truly individualise learning. Education should not be stagnant, rather constantly evolving to find ways to transform itself, prioritising this need to be hand in hand with our fast-changing society which requires creative, active students who challenge the way things have always been done and respond to the demands of our current society. Talent is not something spontaneous, it needs to be fostered and guided to reach full potential, through educational stimulation that allows for neuron synapse within our brains (Vinueza & Castro Terán, 2018). Human talent is the only source of richness that never ends (Correa as cited in Vinueza & Castro, 2018). The environment is an essential factor, if a student feels valued and safe, in a place where errors can be made and, in fact, are a crucial part of the learning experience, then creativity can be explored in its fullness.

Through an education process that enables creativity, human beings are able to define the relevant elements that allow them to reach creative endeavours through the innate potential we each possess (Renzulli, 2017). Through pedagogies that emphasize creativity, students are able to feel true protagonists in their own learning. Teachers and schools must implement education outcomes that promote divergent thinking, allowing students to learn how to think, to problem-solve and investigate, to select content and resources, to make decisions, to work in teams valuing both their own work and that of others (Domínguez y Pineda in del Águila Ríos, Teixeira Ferreira Capelo, Costa Varela, Guerra Antequera, & Antequera Barroso, 2019). In order to successfully incorporate creativity in the classroom, teachers need to reimagine and reinvent education, which translates into re-thinking objectives, pedagogies, teaching strategies, ways of evaluating, and above all, an authentic renovation of the teaching/learning processes (Campos & Palacios, 2018).

The New Pedagogies for Deep Learning [NPDL] (Fullan, Quinn & McEachen, 2018) provides four phases to design learning experiences in the classroom. These include:

“Phase 1: Assess where students are and establish learning goals responsive to individual student needs by creating an individualised Success Criteria.

Phase 2: Design learning experiences that engage all students taking into consideration their background knowledge, experience and needs to work collaboratively to reach the learning goals listed on phase 1.

Phase 3: Implementing learning experiences, with ongoing scaffolded activities to monitor learning.

Phase 4: Measure, reflect and change. Teachers collaborate to assess and document how the students are learning and measure growth. This step would be crucial in developing shared assessing strategies among all teachers to ensure the most effective strategies are being used.”



Fullan, Quinn & McEachen, (2018) *New Pedagogies for Deep Learning*™(NPDL) pp.102-103.

A whole-school approach would be needed to implement this type of real change. Teachers need ongoing support and guidance, bouncing ideas off each other and not being scared of change. This support could be provided for teachers in school by providing professional development and resource development time to school leaders, middle management and teachers.

Creating this engaging, authentic, interactive learning environment that is meaningful to students and allows choice or encourages educational risk to achieve learning outcomes, can be achieved if teachers are ready to transform the classroom. Design thinking, which places a focus on empathy before designing solutions and problem-solving, using virtual reality or augmented reality, gaming, flipped classrooms, and collaborative learning are some of the ways education transformation can be achieved.

Design Thinking

Design thinking is a process commonly used by designers to find the solution to complex issues, navigate new or uncertain environments, and create a new product for the world (Black, Gardner, Pierce & Steers, 2019). Design thinking uses core elements and skills of play, empathy, reflection, creation, and experimentation to collaborate, create, and build upon findings. In design thinking, failure is not a threat, but an avenue to take risks, to think critically and creatively and optimize further learning experiences. Design thinker's welcome difficulties and constraints, as these pave the way to innovative ideas and solutions. Through observation, synthesis, alternatives, critical thinking, feedback, visual representation, creativity, problem-solving, and value creation, entrepreneurs can use design thinking to identify unique venture opportunities. It is important that design ideas are feasible, viable, and desired by people. Children in our classrooms and entrepreneurs leverage design thinking to solve complex problems and navigate uncertain environments by working in multidisciplinary teams who brainstorm, research, prototype, and gathered user feedback on designs. This feedback and findings are an essential inclusion when building creativity in students, and whilst there are numerous creative processes available to students to use in schools, Trevallion's 2020 STEM/Creativity process is just one.

The STEM/Creativity Process (Trevallion, 2020)

Develop a range of skills, understandings, and technological practices in science, technology, engineering, mathematics, critical thinking, secondary and primary research.

2. Ideation and investigation of the problem #Note: The interaction between the individual and the domain.

3. Secondary research and primary research #Note: The interaction between the individual, the domain, and the fields. Researching allows the students to use the technological infrastructures for connecting around the world, making the sharing of ideas much easier. Digital technologies and connectivity now allow individual creators to sidestep traditional gatekeepers like teachers, who previously decided what was and was not considered creativity, and communicate directly with a broader audience, creating a new nexus of expertise and consumption.
4. Communicate the final solution.
5. Manufacture the prototype solution.
6. Test and evaluate through plus, minus, improvement.
7. Manufacture the final solution.

This process, when used in schools, builds success in problem-solving. When using problem-based learning, if the teacher teaches some starting skills and inspires and motivates the class by facilitating multi-directional problem investigations, the students can move through the creative process at their own pace in order to solve the problem creatively through the use of higher-order thinking and critical analysis. There are two main types of thinking used in this process: convergent and divergent. Convergent thinking moves from broad thoughts to concrete understanding, where the thoughts from divergent thinking can be narrowed down to the most promising ideas and solutions. Divergent thinking uses creativity and the imagination to open the mind to new possibilities and solutions, and ultimately become more innovative.

Problem Based Learning (PBL)

Teachers often confuse the terms project-based learning and problem-based learning. Given the importance of problem-based learning, it is critical that it can be isolated and identified as the instructional model in use. Both project and problem-based learning increase student engagement and are active forms of pedagogy based on constructivism theories which claim that learners internally construct knowledge rather than it being ‘poured’ into them by teachers. Project-based learning and problem-based learning are uniquely different, and we MUST avoid the temptation to group them under the same “broad umbrella” (Fisher, 2019) as problem-based learning uses higher-order thinking skills and builds creative where project-based learning involves following a procedure with limited critical analysis or evaluation.

Project-based learning emphasizes the manufacturing of a product using a predetermined procedure with minor variations made throughout the manufacturing process. It delivers a product in the form of a presentation or execution of the solution (Ainur, Roimil, Eko & Purwatiningsih, 2019). Project-based learning has an emphasis on the final product and can diminish the learner’s role and have an over reliance on the final product. While the skills and research conducted to complete a final product are valuable there is less dependence on the process itself (Savery, 2017). As soon as a final product or presentation takes precedence over the learning process it can no longer be problem-based learning.

Problems exist when precise definitions are not observed or when conflicting constructs are created of how problem-based learning and project-based learning relate to each other (Fisher, LaFerriere & Rixon, 2020). Problem-based learning relies on student-directed learning to uncover 'new knowledge' while project-based learning may issue new content to improve skills or relevant knowledge needed to complete the task. The process of uncovering and constructing new knowledge is fundamental to problem-based learning whereas the final product is likely to be critical to the success of project-based learning. The learning environment for problem-based learning is more open and unstructured than the environment of project-based learning (Fisher, et.al., 2020).

In particular, within technology education classrooms, teachers' must consider whether their students are going to ask students to make and build items or using problem solving skills to enhance curiosity, build creativity, to build multi-disciplinary and multimodal skills, higher order thinking, to follow the design process in order to open the child to a world of creativity, individualized, self-directed meaningful learning, featuring cross-curricular content that will allow them to flourish in an array of challenges in a world that inspires them to learn.

Flipped Classrooms

Bull-Fabriga, Martinez Casanovas, Ruiz-Munson and Leal Filho, (2019) explain that a flipped classroom draws on concepts such as active learning, experiential learning, student engagement, hybrid course design, and course podcasting. In the flipped classroom, students complete learning normally covered in the classroom in their own time (by watching videos and/or accessing resources), and classroom time is dedicated to hands-on activities and interactive, personalised learning, leading to deeper understanding. Students use class time to apply the theory and concepts discussed in the videos and to utilise techniques including group problem-solving and team-building games, simulations, case study reviews, and group discussions.

There is no single model for the flipped classroom - the term is widely used to describe almost any class structure that provides pre-recorded lectures followed by in-class exercises. The important aspect is how the videos and other online resources are integrated with classroom learning (Bull-Fabriga, et. al., 2019). The value of a flipped class is in the repurposing of class time into a workshop where students can enquire about lecture content, test their skills in applying knowledge, and interact with one another in hands-on activities. During class sessions teachers function as coaches or advisors, encouraging students in individual creativity, enquiry and collaborative effort which emulates professional practice.

The wide range of potential benefits of using a flipped classroom includes, providing an opportunity for reflection, it is used to revisit important concepts and content, checking understanding and clearing up misconceptions, it assists students with accessibility concerns,



assist students with English as a second language, it helps students revise content, it assists peer learning and social interaction through collaborative projects, it teaches students to take responsibility for own learning, increases student-to-student engagement and shift priorities from covering materials to mastering (Bull-Fabriga, et. al., 2019).

Challenges that can arise when using flipped classrooms include: the students may not be prepared, time, expertise and effort are needed to create/source videos, a flipped classroom requires careful preparation, and the right mix of out-of-class, and in-class elements. Flipped classrooms are not appropriate for some types of content, students may not immediately understand the value of this model, equipment, and access for students to view video lectures may be an issue, there may be problems with the availability of class spaces that support active and collaborative work, the flipped classroom entails a change in the role of students and staff (Bull-Fabriga, et. al., 2019). All students need to develop their own preferred learning style as all learn differently and teachers need to become facilitators of their learning in order to build the critical thinking skills in each of their students.

To teach using flipped classrooms teachers must: Communicate the rationale behind the flipped classroom to your students, provide incentives for students to prepare for class, provide clear connections between in-class and out-of-class activities, ensure that classroom activities are clearly defined and well-structured to suit the purpose, allow sufficient time for students to carry out their assignments, provide facilitation and guidance that supports a learning community, provide prompt and adaptive feedback on group and project work and utilise technologies that are familiar and easy to access (Teaching NSW, 2020)

Collaborative Learning

Students learn the true meaning of collaboration through being able to share ideas with each other and the rest of the world, thus giving them a true sense of connecting and belonging. Teachers are active and constantly evolving, able to assess ongoing growth, and designing more activities to address their student's needs and interests, creating a whole-school culture of collaboration and multidisciplinary knowledge sharing. This enables a caring environment, where relationships are built on genuine trust and mutual respect (Fullan, Quinn & McEachen, 2018). New Pedagogies for Deep Learning promises a partnership with families, which often feel disconnected from their children's secondary school lives as parents and carers are involved in the learning process (Fullan, et. al., 2018). Changing the dynamics within classrooms would indeed require an open attitude to change and all it entails.

There is a need for teachers to implement this ongoing reflective practice, providing open dialogue with students and peers to be able to trial and error the new methodologies (Fullan, et.al., 2018). Giving students a real chance to become critical and independent thinkers that co-create content with the teachers would make this education transformation come alive into a tangible reality (Fisher, et.al. 2020). The urging need for change needs to be addressed now, as

“the old system works for only a minority, and those who succeed, with better marks, for example, are not at all that well off either when it comes to living in increasingly complex times” (Fisher, et.al. 2020).

According to De Prado & Núñez-Lagos as cited in del Águila Ríos et al. (2019), in order to practice real creativity in the classroom the following factors must be taken into consideration: originality, fluidity, productivity, flexibility (creativity is mental agility, featuring multiple perspectives which are both contrary and different), elaboration (processing and organising information), analysis (allows for deep understanding), synthesis (extracting the most valuable features), empathy, open-mindedness, communication, redefinition (re-imagining new uses and applications to already existing ones), and inventiveness.

Fullan, Quinn & McEachen, (2018) posit that creativity is promoted and implemented in the classroom is through using the *New Pedagogies for Deep Learning* (NPDL). This is achieved through the use of the 21st Century learning skills and the 6Cs of global competencies: character, citizenship, collaboration, communication, creativity, and critical thinking, the learning process combines both personal and collective meaningful learning that matters to all parties concerned and providing a change in culture. Fullan, Quinn & McEachen, 2018 describe these characteristics as:

- “1. Character: Learning to learn; grit, tenacity, perseverance, and resilience.
2. Citizenship: Thinking global citizens; considering global issues based on a deep understanding of diverse values and worldviews; genuine interest and ability to solve ambiguous and complex real-world problems that impact human and environmental sustainability; compassion, empathy, and concern for others.
3. Collaboration: Working interdependently and synergistically in teams; interpersonal and team-related skills; social-emotional, and intercultural skills; managing team dynamics and challenges; learning from and contributing to the learning of others.
4. Communication: Communicating effectively with a variety of styles, modes, and tools including digital; communication designed for different audiences; reflection on and use of the process of learning to improve communication.
5. Creativity: Having an “entrepreneurial eye” for economic and social opportunities; asking the right inquiry questions; considering and pursuing novel ideas and solutions; leadership to turn ideas into action.
6. Critical thinking: Evaluating information and arguments; making connections and identifying patterns; problem-solving; constructing meaningful knowledge; experimenting, reflecting, and taking action on ideas in the real world.” Fullan, Quinn & McEachen, (2018) *New Pedagogies for Deep Learning* TM(NPDL) p. 17.

NPDL have many similarities with Freire’s (2000) transformative approach, where students are treated as true agents of change in that learning is treated as something that will be perceived

as it is meaningful, now and in the future. Students are capable of using their learning to transform how and what they learn and use in the world around them. For all students, this transformation is inclusive, but their learning can only change if they have teachers who are able to facilitate transformative learning that is equitable and accessible to all students.

Through deep learning, participants involved are the student, their teachers, families, and the community. This is what makes the learning process authentic, it a true learning process for all that is perceived as being real, not something we are doing for school Roosegarde, (as cited in Fullan, et. al.2018), advises learning should be always driven by curiosity, using relevant real-world issues as an inspiration for change. They suggest that students can learn how to solve those problems by designing solutions through both real and hypothetical scenarios. Getting students truly involved in being problem designers, means allowing room for risk-taking and being prepared for failure. This is important to experience because in a supportive environment risk-taking and failure prepares students to learn resilience and acceptance that all work takes effort and mistakes are an expected natural part of learning. Roosegarde (2018), also suggests teachers should believe all students will exceed all our expectations, as creativity and innovation are part of our DNA, this raises the expectations that students strive to achieve every day.

Fullan, Quinn & McEachen (2018), have presented much evidence showing that deep, real, and authentic learning is working in many schools around the globe, especially benefiting those students who are at a disadvantage or disconnected from their school life who are improving their academic results, general wellbeing whilst lowering attendance issues and drop-out rates. They have presented qualitative evidence in the form of multiple case studies from numerous schools who are implementing the NPDL. The findings show that students who are given a voice and choice are motivated and involved in their learning, as they are engaging in the creation of real change, with programs and educational activities that make them feel as the centre of something important, deeply involved in society (Fullan, et.al., 2018).

To reimagine education

Education systems worldwide are being reformed to meet the challenges of the 21st century (Silva, 2017) but many countries are pushing reforms in the wrong direction and that the dominant culture of standardization and testing is stifling the very capabilities that our children, communities and economies need most. (Silva, 2017) Urging schools and colleges to rethink their basic assumptions about intelligence and achievement, means that radical changes in how we educate all students to meet the extraordinary challenges of living and working in the 21st century are needed. Sir Ken Robinson (2020) joined “The Call to Unite” to invite us all to imagine a new normal, and to understand how we can create a world that values the diversity of each individual's unique gifts and talent.



At a time when standardized testing businesses are raking in huge profits, when many schools are struggling, and students and educators everywhere are suffering under the strain, Robinson and Aronica (2016) point the way forward as they suggest how to transform troubled educational systems. They argue for an end to our outmoded industrial educational system and proposes a highly personalized, organic approach that draws on today's unprecedented technological and professional resources to engage all students, develop their love of learning, and enable them to face the real challenges of the twenty-first century. Robertson and Aronica (2016) have focused on one of the most critical issues of our time and want a revolution in education and they want us--you--to be the change. They provide a sense of possibility to the goal of transforming education but also suggest actionable strategies that involve changes to how we understand schools, learning, and most importantly, the passion and talent of our students.

Ken Robinson and Lou Aronica (2019) vividly describe the disruptions that are needed if we are to have quality education. Learning is the natural process of acquiring new skills and understanding and human beings are gifted with profound powers of imagination. Imagination is the ability to bring into mind, things that are not present to our senses. We are responsible for the habits of mind which keep the system in place, within the schools and we must now include a diversity of learning and an ecosystem of groups that use creativity in their daily practice. Creativity is putting your imagination to work; it's materialising your ideas – bringing them into being. Don't wait for anyone to do it. You are the system; we're all the system; we're it so as Nike happily tells us "Just Do it."

Transformative Education

Each teacher must consider how they will promote creativity in their classroom. Considering how to create that enriched environment, provide inspired learning, supportive risk-taking, and positive reinforcement, builds quality skills and disciplined learning. It must be remembered that creativity is not direct instruction, it is about enabling opportunities where teachers mentor and nurture creativity in their students, allowing them to understand that all ideas have value and that they should never neglect or discard them due to possible embarrassment (Silva, 2017).

The role of teachers in schools is to ensure students construct their own understandings and build upon existing knowledge, thus increasing their zone of proximal development (Vygotsky, 1934) which is the centrepiece of education, and to facilitate learning. It is not the teacher's role to simply deliver content. Students are diverse and have a capacity that needs refinement, they need to find a purpose and it is the teacher's job to help them find it whilst considering the impact of cultural opportunities and education. For education to be transformative, teachers must be clear about what they want to change and how to change it. For this reason, school support in the form of time and professional development is a must. It is important not to remove people and relationships as education must be deep, profound, and personal. Within

transformed education, teaching must be front and centre, it must be filled with diversity because there is a range of diverse students in the room. It must be creative because this is the pulse of human achievement and innovation, and we must work collaborative to take control of our profession Robinson and Aronica (2019a). A whole-school approach would be needed to implement this type of real change. Teachers would need ongoing support and guidance, bouncing ideas off each other and not being scared of change.

Finally...

The state of our education system has plenty of room for improvement. However, developing a plan to take schools in the right direction is easier said than done. The first challenge lies in identifying underlying problems keeping students from learning today. This challenge, in part, is due to the fact that the problems may change considerably, depending on who is labelling them, whether it is students, parents, educators or lawmakers. Factors impacting on teaching in classrooms today are the class size, low socio-economic status areas, familial factors, bullying, the use of technology, student engagement and parental involvement and attitude to learning.

The numbers of students in classrooms are impacting upon student learning. Teachers agree and research shows (Schnitzler, Holzberger & Seidel, 2020) that they cannot effectively teach every student in a classroom, if the class size exceeds 30 students. Large classrooms make discussion and group work more difficult. A study conducted by Schnitzler, Holzberger and Seidel in 2020 found that in larger classrooms, students were less engaged. Also, the teacher had more negative behaviours to address with students who were having difficulty in school. Overall, the research shows that students in smaller classes perform better in all subjects and on all assessments when compared to their peers in larger classes. In smaller classes students tend to be as much as one to two months ahead in content knowledge, and they score higher on standardized assessments.

Students residing and attending schools in low socio-economic status areas tend to have the highest dropout rates from school as they disengage and seek employment to help provide for the family. Studies from show that students who do not get enough food or sleep are less likely to perform at their full academic potential (Maheshwari & Shaukat, 2019). Schools know these truths first-hand, and despite efforts to provide students with essentials, teachers, administrators and lawmakers know there are simply not enough resources to provide for all. Although disadvantaged school programs help, they are often not enough to impact on student engagement and learning. Familial factors play a role in teaching students. What is occurring in the family home impacts on a student's propensity to learn (Zhonglu Li & Zeqi Qiu, (2018). Divorce, single parents, poverty, violence, and many other issues are all challenges a student brings to school every day. Everyday teachers and administrators work with children in less-than-ideal family environments trying to engage them and motivate them to learn.

Today students are quite technologically advanced with coding curriculums starting in kindergarten. Teachers today, must build the skills and become techno-savvy to use devices to motivate, inspire and bring education and technology together. Technology is used in multimodal learning to inspire, motivate, and engage students as they solve problems relating to new concepts. Technology must be used in the classroom to meet the learning demands of the 21st century. Bullying is not a new problem, but it is one that has a profound impact on the learning aptitude of students. Technology has given bullies even more avenues to torment their victims – through social networking, texting, and other virtual interactions. Cyberbullying is an issue for schools, as evidenced by the number of suicides that can be directly traced to bullying events (Chen, 2020). Laws remain unclear regarding cyberbullying, and this adds to the challenge leaving parents, teachers and administrators unsure of the legalities and in a grey area when handling these important issues. Many schools are administering anti-bully programs in order to correct behaviour. Student attitudes, their boredom, lack of engagement, disrespect and absenteeism are a major problem facing schools today and pose significant challenges for teachers. Whilst there has been much debate and discussion about how to overcome these issues, it is commonly agreed that using available technologies and individualising the learning process has a major impact.

Sir Ken Robinson and Lou Aronica (2019) address these fundamental economic, cultural, social, and personal purposes of education. They argue that education should be personalised to every student's talent, passion, and learning styles and that creativity should be embedded in the culture of every single school. They espouse that we need to teach our children to be creative, to build original ideas with value. This is important because these basic principles and tools guide students to do the work they enjoy with a sense of contentment and purpose. Robinson, (2019b), explains that teachers need to thoughtfully and strategically champion the notion that the non-academic components of our education system should be considered with how they can help culture a new form of children and humanity out in the world creatively solving the biggest problems of today.

Sir Ken Robinson's (2017b) ideas to revolutionize, not to just reform education challenge conventional wisdom and inspire a whole new approach to our educational system. Teachers must transform education so creativity and individual talents flourish and our children can meet the future wisely. This paper suggests how schools can build self-improvement, happiness, creativity, and personal transformation. The concept of self-fulfilment can be built through the convergence of natural talents and personal passions within school. Individualised education will occur as teachers develop in their students answers to the following questions.

How do I find out what my talents and passions are?
What if I love something I'm not good at?
What if I'm good at something I don't love?
What if I can't make a living from my creativity?



How do I do help my children find their creativity?

We must contemplate the importance of and implement an education that educates not just the mind, but also the heart, we need to create an education system that nurtures creativity. We now need to nurture our youngest generations with a climate of possibility rather than what is share our visions of how we can shape tomorrow.

Within education it is a critical time as concerns about the economy, education, and the environment continue to grow and the need to connect to our personal talents and passions has never been greater. There is a major concern that our schools are failing to recognize creativity; we are failing to prepare the next generation for the challenges that lie ahead. Sir Ken Robinson (2017) argues that education should be personalised to every student's talent, passion, and learning styles, and that creativity should be embedded in the culture of every single school. We must make a case for a radical shift from standardized schools to personalized learning creating conditions where children's' natural talents can flourish as finding your passion changes everything.

“Make me care”. Sir Ken Robinson and Lou Aronica (2019) turned these three words into a mantra for teachers for the future of education. “We don't do education to students, we do it with them.” The world's most potent advocates of global education transformation; their clarity, passion, and insight have inspired millions, including us. Think about what you, as a teacher, might do with others to start making the changes. Creative schools indeed! The timing is perfect.

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