

Creating Creators

> How can we enhance creativity in education systems?





“We believe that all children have the potential to be creative, a potential that can be nurtured over time”

➤ John Goodwin, CEO of the LEGO Foundation

Foreword

Creativity Matters. It matters for countries, economies, employers, parents and learners. Six years on from our Cultures of Creativity report, which considered how creative mindsets could be nurtured across cultures, we at the LEGO Foundation believe that creativity now matters even more.

We are not alone. Organisations such as the World Economic Forum, the OECD, and Education Ministries across the globe are increasingly recognising that concerted reform is needed to address the skills gap, with creativity now seen as one of the most important skills needed for today's, and tomorrow's learners. In the WEF's 2016 Future of Jobs survey, large employers placed creativity as the tenth most in-demand skill. Only last year, they placed it in fifth position, well on track to achieve their forecast of third most in-demand skill by 2020. The trajectory for creativity skills demand is clear and education leaders and policymakers are already convinced of the need to reimagine learning. But how can we address this creativity crisis – the gap between the desire for creativity and the ability of education systems to develop this skill?

Education reformers are already mobilising and thinking, often creatively, about the types of data, resources, tools and approaches that education systems need to address this creativity crisis. Capitals such as Abu Dhabi, Bangkok, Cardiff, to name just a few, are already taking action. The OECD's 2021 Programme for International Student Assessment will assess creative thinking, aiming to provide participating countries with valid, reliable and actionable measurement tools to engage policy makers, educators and the general public in a debate on ways to promote creativity in schools.

We at the LEGO Foundation are also keen to bring our insight, experience and voice to the table – shining the spotlight on the importance of better understanding and promoting creativity both within and outside the classroom. We believe that all children have the potential to be creative, a potential that can be nurtured over time. Indeed, we believe that the purpose of education is to help realise the potential of each child to become creative, engaged, lifelong learners. With a deep understanding of the transformative power of play, we also believe that when children learn through play, they are given the best

opportunity to fulfil their potential, and that learning through play is one solution to the creativity crisis.

This report is the first in a series of the LEGO Foundation publications on the importance of creativity in education systems. The Creativity Matters series aims to highlight not just why creativity matters, but how education systems can best adapt and reimagine learning to equip today's and tomorrow's learners with creative skills, mindsets, and confidence.

Creating Creators convenes perspectives from across the education spectrum – Academic, Assessor, Enabler, Government, Learner and Teacher. These perspectives offer opinions, not necessarily shared by the LEGO Foundation, on how we can enhance creativity in today's and tomorrow's education systems. Together, our contributors consider why it is important to develop students' creativity, how Learning through Play and other techniques can be used to enhance this skill in the classroom, and the ways creativity can be assessed. We hope that these perspectives will enhance our shared understanding of the challenges and opportunities we face in tackling this creativity crisis.

I would like to thank our contributors for their valuable contribution to this debate. The creativity clarion call has been sounded, and we hope that this report adds some kindling to the creativity fire!



John Goodwin,
CEO of the LEGO Foundation



Our creativity ambition for South Africa's classrooms



SPECIAL CONTRIBUTOR

Angelina Angie Matsie Motshekga

Minister of Basic Education,
Republic of South Africa

Short Bio: Angie Motshekga is the Minister of Basic Education in the Republic of South Africa since May 2009 and a member of the African National Congress's (ANC) National Executive Committee. She holds a MA and Bachelor of Educational Science degrees from the University of the Witwatersrand; and a BA in Education degree from the University of the North. She was an educator at Orlando High School (1981-1983) and a lecturer both at the Soweto College of Education (1983-1985) and the University of the Witwatersrand (1985-1994). She also served as Director in the Office of the President (1994-1997); Deputy Secretary of the ANC Women's League (1997-2007); Executive Member of the National Education Union of South Africa; Member of the Gauteng Executive Council (MEC/ provincial minister) for Social Services and Population Development (2000-2004) and MEC for Education (2004-2009); Deputy Chairperson of the ANC in Gauteng; and Member of the Gauteng Provincial Legislature (1999-2004).

Creativity, along with other skills such as collaboration, communication, critical thinking, social and interpersonal skills, technology and computer skills, and listening skills, amongst others, has been identified as one of the important skills for success in an ever-changing world that is inherent to the 21st century.

In an increasingly complex, changing, competitive, and interconnected world, we all want to ensure that our children gain the skills needed to be successful in life. Experts worldwide, acknowledge that today's children need more than the traditional 3-R's (reading, writing and arithmetic) to prepare for 21st century opportunities. As Government, we are paving the way for this, by preparing our children in the six critical areas, namely the 6-Cs as constructed by Golinkoff and Hirsh-Pasek: collaboration, communication, content, critical thinking, creative innovation, and confidence.

The ability to generate innovative and workable ideas together with flexibility and creative problem-solving is one of the most sought-after skills for hiring in the 21st century. Creativity is a determinant for personal, academic and professional success in this changing world.

Creativity is not merely a personality trait that some have more of than others. Creativity is actually a skill that can be taught, starting at the earliest age right through the education system. Through applying active pedagogical principles, creative problem-solving and divergent thinking are skills that every learner can develop.

The 21st century demands that educators be the pioneers of a radical pedagogical revolution as we

embrace new technologies and pedagogical approaches which in themselves will fundamentally redefine the meaning of teaching and learning as we have known it. We need to look critically at the previous pedagogy which was largely influenced by methodologies of rote learning.

One of the aims of the South African National Curriculum Statement Grades R-12 (NCS), is to produce learners that are able to identify and solve problems and make decisions using critical and creative thinking. However, too often, creativity is not perceived as an inherent part of the formal education system. The mantra, as we know it, has been the Test, Teach, Test (Triple 'T') approach. It is time that we abandon the notion that the triple 'T' approach, is the Alpha and Omega of teaching and learning. There is an important paradigm shift, even in the theorisation of pedagogy itself. The dominant narrative gaining traction today is Goodson and Gill's critical narrative as pedagogy. Given the tumult in South African education today, critical narrative as pedagogy is a possible antidote to both teach-test-

“We are now being asked to teach our teachers new skills in order to teach learners what actually comes naturally to them – that is learning through play.”

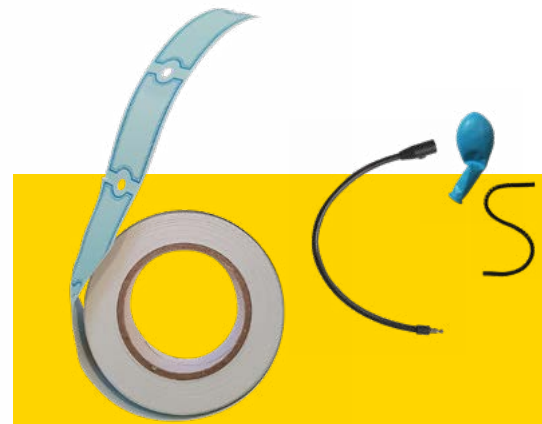
teach and rote learning; and is a positive, restorative endeavour, countering the teach-to-test philosophy currently prevalent in the South African education landscape and elsewhere.

We are now being asked to teach our teachers new skills in order to teach learners what actually comes naturally to them – that is learning through play.

In this new teaching paradigm, learners are taught to play, but not in a superficial way. Learners play to learn – in order to create something that is both fun and educational at the same time.

Our biggest asset in transforming education systems to meet the demands of the 21st century is our teachers. Teachers have the responsibility across all grades to prepare this generation for a world where they need to be creative, innovative and adaptable. Teachers themselves need to embrace the pedagogical power of creativity in their classrooms. A creative teacher can transform the most rigid curriculum into a positive active learning experience that will assist children to master the knowledge and skills needed for both today, and tomorrow.

We can no longer teach 21st century learners using old pedagogical methods alone. The future beckons, and that future is digital – the fusion of technologies that is blurring the lines between the physical, digital, and biological spheres. It is an exciting world where



6 C's The six areas the South African government is preparing children in:

Collaboration
Communication
Content
Critical thinking
Creative innovation
Confidence

➤ Constructed by Golinkoff and Hirsh-Pasek

play-based learning and other active pedagogies not only play a role in the cognitive development of the child, but development of each child's ability for collaboration, communication, content, critical thinking, creative innovation, and confidence.

Our challenge is to provide leadership to direct, equip and empower the education sector, especially our teachers – from early childhood development to the final year of schooling – to navigate the uncharted territory of rapid non-linear changes in pedagogies.



Why is it important to develop learners' creativity in the 21st century?



ENABLER

Dr. Helen Charman

Director of Learning and National Programmes,
Victoria and Albert Museum

Short Bio: Dr. Helen Charman is the Director of Learning and National Programmes at the Victoria and Albert Museum, London. A creative and cultural learning professional for over 25 years, her specialism is design education in museums. Her professional portfolio encompasses schools, universities, galleries, museums, festival organizations, local authorities and charities. She was a founder member of the education team at Tate Modern (2000) and on the directorate team that mobilized the new Design Museum, London (2016). She gained her Doctorate in Education and Masters in History of Art from the University of London, and Bachelor of Arts in English Literature from Oxford University.

Opposite my desk at the Victoria and Albert Museum in London hangs a bossy bright blue poster by graphic designer Anthony Burrill, framed by a sunny, dandelion yellow wall. It is in my direct line of sight and I glance at it countless times a day. When I have meetings (and I have many, many meetings) I always sit facing it. It comprises three simple words: Ask More Questions. This is my work mantra. Why? Because curiosity is at the heart of creativity. This is the first proposition I make here in my argument for the vital and intrinsic need to develop students' creativity today. Creativity starts with curiosity.

Why is curiosity important? Curiosity is essential if we are to understand the world, understand ourselves, and understand others. All three are vital components of growing up and learning how to navigate the world, ourselves and others. Curiosity is what motivates us to explore the world – the world of ideas, the imagined and the real. Curiosity opens up the space of imagination, of 'what if?' and 'how might we?' questions. Imagination fosters a space of possibility and potential, a space to play with ideas, and with things.

This leads me to my second proposition about creativity. Creativity is fostered through play. What may seem like a tautology bears further consideration – play is how we try ideas on for size, how we test and experiment with 'what might be'; how we make connections between ideas, people and things; play is how we learn. Learning through play is especially – in fact, exponentially – impactful in our earliest years when the infant brain is at its most plastic and receptive. But this plasticity continues across the life course and is an essential neurological and psychological factor for our ability to adapt to change – an ability never more needed by young people than in today's fast-moving world, where uncertainty abounds.



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Anthony Burrill

This leads me to my third proposition: creativity as a driving force both for affecting positive change and for adapting to change. When a creative act happens, the world is not the same as it was before. Creativity effects change. And change happens when it is fired by an act of the imagination, which then becomes materially manifest and expressed in the world through language and behaviour.

“Creativity is sparked by curiosity and imagination. Creativity develops through playing and experimenting with ideas and things. Creativity is a driver for change and for adaptability.”

So we have three propositions concerning creativity. Creativity is sparked by curiosity and imagination. Creativity develops through playing and experimenting with ideas and things. Creativity is a driver for change and for adaptability. Loosely federated, these three propositions add up to a designerly approach to thinking and acting in and on the world for positive change. And the development of this ability to act in and on the world – let’s call it creative agency – is vital for every young person’s education today, because the world which they inhabit and will inherit is faster-moving, and more complex and uncertain, than perhaps at any time before. It’s a world of untold possibility and potential, which demands thinking afresh about the skills and aptitudes required such that young people can rise to, and embrace, its manifold challenges and opportunities.

The question of what these skills and aptitudes are is one that much occupies our thinking as museum learning professionals in today’s complex world. At the V&A we

are engaged in a process of reinventing museum learning for the 21st century by harnessing the potential of design and creativity to build creative agency and confidence amongst future generations. Our capital project to transform the Museum of Childhood from a museum of the social and material history of childhood, to a creative and design-led incubator for children and families, tackles this head on. In this endeavor, the work of thought leaders and experts from global education to neuroscience and developmental psychology is instrumental. We are exploring the broadest contexts for museum learning as well as drawing on the work of creative practitioners in art, design and performance, the three fields that comprise the V&A’s collection. Object-based experiential learning is a powerful source of inspiration for students: by directly engaging with material expressions of the ‘made’ world, they develop their own creative agency and gain insight into its potential as a force for change.

Design in particular is a force for positive change and this is why we focus educational activity on creative, design-led approaches to teaching and learning. Design constantly innovates to meet changing needs. These needs are manifest at the level of the individual and community, from local to global, from object-based to service-led. We live in a fast-changing world leading to an uncertain future, generating new types of needs and challenges with startling rapidity. Designerly learning – a creative cycle that encompasses divergent and convergent thinking across imagination, experimentation and creative problem solving within the constraints of a design brief – can help equip young people to meet the needs and address the challenges of this fast-changing world, with creative confidence anew.

That the world is undergoing rapid change is not news – but it is still newsworthy. A rubric of oft-rehearsed factors influencing the speed of change encompass what is described as the ‘fourth industrial revolution’ or ‘Revolution 4.0’ – meaning, the fusion of the technological, physical and biological worlds. Students need to be enfranchised creatively to navigate this world – which calls to mind designer Alexandra Daisy Ginsberg’s beautiful and provocative photographic work ‘Designing for the Sixth Extinction’ (2013). It’s a compelling example of the power of divergent thinking – meaning the act of imagination and its creative articulation – to explore and create a space of potential and possibility, a space of how the world might be. In this instance, Ginsberg’s is a world in which synthetic biology tackles the challenge of endangered species and climate pollutants wrought by the Anthropocene in an era of climate change.

Climate change is the most significant of impacts that is reshaping our world. But see also: a rapidly ageing population. Austerity. Brexit (for the UK). Trump’s America. Artificial Intelligence. Antibiotic resistant pathologies. The future of work ... there is a multitude of geo-political, environmental, technological, social and cultural change factors afoot. Change is the constant,

and though it has ever been so, in the 21st century it is happening faster than ever. As this is the world that young people inhabit and will inherit, it is one in which they will need creative agency to navigate and shape its complexities. It's either that – or be shaped by the world. Act – or be acted upon.

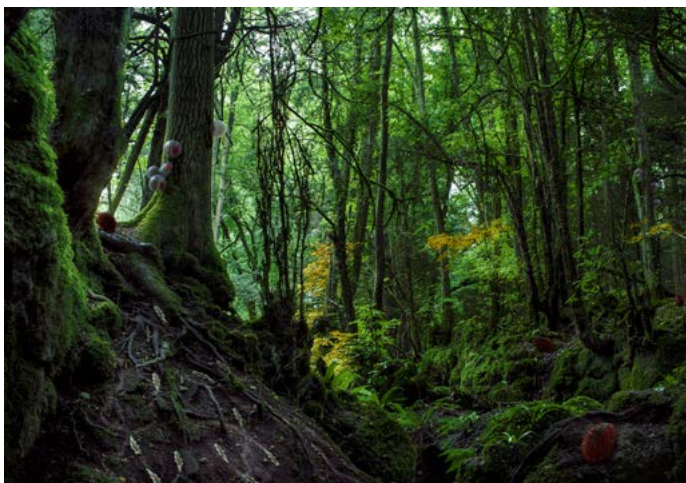
“...creativity has an intrinsic and invaluable role in the education of future generations in today's uncertain world.”

I have argued here that creativity has an intrinsic and invaluable role in the education of future generations in today's uncertain world. It is the students of today who will shape the world in the future. But the risk is that creativity will be crowded out by curricula that prioritize 'know what' over 'know how'. And so I applaud the LEGO Foundation for its commitment to promoting the value of creativity for students today. This mission has been the core endeavor of learning at the V&A since our inception as the South Kensington Museum in 1852.

Today the V&A continues to inspire the next generation of creatives, innovators, designers and entrepreneurs who will shape the future, reaching 400,000 learners annually onsite, nationally and online. Onsite the museum is daily thronged with young people exploring creativity and innovation through direct engagement with material culture of the 'made' world from architecture to virtual reality. Nationally, our Design Lab Nation project establishes creative ecologies between schools, local creative industry and museums with V&A Collection objects on loan to partner galleries in five UK cities. Each city – Blackburn, Coventry, Sheffield, Stoke and Sunderland – has a rich industrial heritage in which

the projects are embedded. Online we reach tens of thousands of students with resources, which position the museum as a digital sourcebook for creativity. We work with a further 400,000 visitors a year at the Museum of Childhood.

That the PISA innovative domain assessment for 2021 focuses on creativity is testament to a global understanding of its critical value for students today. Yet despite this, creative subjects in England are fighting for their place in schools. Henry Cole, as inaugural director of the V&A, made a clarion call for the power and importance of the museum as a powerhouse for creativity and design: the V&A was to be 'a school room for everyone'. 150 years on, this exhortation is more vital and relevant than ever. To return to the bossy blue poster in my office, the question to ask now is not why creativity is important for the lives of students in the 21st century, but rather, how creativity can be embedded in every young person's education, everywhere, in a fast-changing world.



<
Alexandra
Daisy
Ginsberg

>
V&A Schools
Programme,
Creative Quarter





Assessing creative thinking to empower learners



ASSESSOR

Andreas Schleicher

Director for the Directorate of Education and Skills, OECD

Short Bio: Andreas Schleicher is Director for the Directorate of Education and Skills, OECD. He initiated and oversees the Programme for International Student Assessment (PISA) and other international instruments which create a global platform for policy-makers, researchers and educators to innovate and transform educational policies and practices. He has worked for over 20 years with Ministers and educational leaders around the world to improve quality and equity in education. U.S. Education Secretary Arne Duncan said about Andreas in *The Atlantic* (7/2011) that “He understands the global issues and challenges as well as or better than anyone I’ve met, and he tells me the truth”. Andreas is the recipient of numerous honours and awards, including the “Theodor Heuss” prize, awarded for “exemplary democratic engagement” in the name of the first president of the Federal Republic of Germany. He holds an honorary professorship at the University of Heidelberg.

The world is rapidly changing. Today’s youngsters will likely be employed in roles that do not currently exist, responding to societal challenges that we cannot possibly anticipate and using technologies that we cannot yet imagine. It is likely that future work will pair computer intelligence with humans’ cognitive, social and emotional skills, attitudes and values. It will then be our capacity for innovation, our awareness and our sense of responsibility that will enable us to harness the power of artificial intelligence to shape the world for the better. This will enable humans to create new value, which involves processes of creating, making, bringing into being and formulating, and can generate outcomes that are innovative, fresh and original, contributing something of intrinsic positive worth. It suggests entrepreneurialism in the broadest sense – of being ready to try, without being afraid of failing. In this light, it is not surprising that employment in Europe’s creative industries, that is, industries that specialise in the use of talent for commercial purposes, grew at 3.6% during the crucial period between 2011 and 2013, a time when many European sectors were shedding jobs or showing stagnant employment rates, at best. In several leading European countries, the growth of creative jobs outpaced job creation in other sectors, including manufacturing.

This poses a dilemma for educators. The kinds of skill that are now easiest to automate are also those that are easiest to teach. We can solve this dilemma by teaching ways of thinking, including thinking creatively and outside the box.

For many people, the concept of creative thinking conjures images of the famed Geniuses, such as Leonardo or Mozart, whose ground-breaking masterpieces defined

the cultural or social Zeitgeist. However, the ability to think creatively is far more common than that: we have all been creative thinkers in one way or another. Creative thinking does not only apply in contexts that centre on the expression of one's inner world or imagination, such as the written, visual or performance arts. It also applies to other areas of life where the generation of new and different ideas is functional to the resolution of problems – including everyday problems such as cooking a tasty meal using leftovers or solving a scheduling problem – or society-wide concerns.

In more general terms, creative thinking enables us to break out of routine performance scripts and search for new, different solutions; to try something counter-intuitive when all else fails; to look at problems from different angles or starting points; and to construct new methods rather than following pre-determined recipes of action. Crucially, it allows us to generate answers that we may have never considered before, and indeed also new questions. Creative thinking is thus more than simply coming up with random ideas. It is a tangible competence that can be developed and that supports individuals to achieve better outcomes, not only by solving problems in constrained environments, but also by pushing the boundaries of what has come before.

Perhaps just as importantly, creative thinking can provide a key source of engagement for young people at school, as it can help them to discover, define and develop their talents, particularly so for those who might otherwise be considered 'low-achievers' in traditional subject areas. That is not to say that creative thinking and content knowledge must develop separately or in discrete contexts. In fact, knowledge and creative thinking support each other and can be nurtured simultaneously in all subjects by using pedagogic approaches that encourage exploration, problem finding and discovery, rather than rote learning.

I met several teachers who have put creative thinking at the front and centre of their education mission. For example at Kosen schools in Japan, I observed learning

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that was both cross-curricular and student-centred, and teachers were mainly coaches, mentors and facilitators of hands-on, project-based learning. Kosen students typically work for several years on bringing to life their big ideas. Yet this is still an isolated example.



We need to do more to support educators worldwide in recognising, promoting and rewarding creative thinking, as well as thinking creatively about their own work too.

However, a major challenge to teachers' and education systems' ability to foster and monitor progress in their students' creative thinking is the lack of understanding about what exactly it is, why it is important, and how it can be nurtured within school and at different ages. This is why we need to develop new and valid ways to assess creative thinking.

For the first time in 2021, PISA will assess students' proficiency in creative thinking. This innovative assessment will encourage a wider policy debate on the importance of supporting this crucial competence to unleash young people's potential to think outside the box, discover their talents and make a difference in their worlds.

The 2021 assessment of creative thinking represents a natural progression for PISA, which has always focused on measuring young people's ability to apply their knowledge to novel situations. The major innovation of this new assessment lies in the open-ended nature of the tasks. Instead of asking students to solve a given problem that has one 'right' answer, students will be encouraged to express their imagination and suggest creative solutions in a variety of open contexts. Their capacity to think flexibly and generate original answers will be rewarded in the assessment.

In 2017, the OECD assembled a group of international experts who together have mapped existing work and developed a conceptual framework for the assessment of creative thinking in PISA. Over 80 countries and jurisdictions have actively supported this process. This wealth of perspectives and expertise from all over the world brings strength to our work, raising the confidence that we are developing definitions, learning targets, tasks and questions, that are meaningful across different cultures.

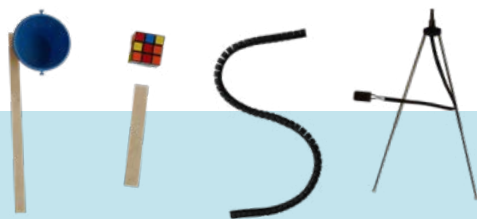
So how does PISA conceptualise creative thinking? Creative thinking is defined as the competence to engage productively in an iterative process involving the generation, evaluation and improvement of ideas that can result in novel and effective solutions, advances in knowledge and impactful expressions of imagination. This competence is enabled by domain knowledge, cognitive skills, curiosity, confidence, goal orientation and task motivation, as well as by social conditions, and can be exercised individually or as part of a group.

PISA will primarily measure the extent to which students can generate diverse and creative ideas when working on open, real-life tasks, and the extent to which they can evaluate and improve upon those ideas. Students will have an opportunity to play with their ideas in four different 'domains': written expression, visual expression, scientific and mathematical problem solving, and social and interpersonal problem solving. They will thus engage in different playful activities such as writing short stories, creating a catchy logo, finding multiple methods to solve an engineering problem, or exploring innovative solutions to complex social issues. The inclusion of multiple domains in the assessment will enable a more comprehensive overview of the relative creative strengths and weaknesses of students in PISA countries, and will let us investigate how these are related to the values, curriculum and pedagogies of education systems. The questionnaire that follows these creative

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tasks will gather information about students' openness to new ideas and other socio-emotional enablers of creative thinking, as well as about students' opportunities and social incentives to think creatively in their life inside and outside school.

Education used to be about giving people access to pre-digested knowledge. Now, it should be about helping students develop a reliable compass and the navigation skills to find their own way through an increasingly uncertain, volatile and ambiguous world. By including creative thinking in PISA, we are sending a clear message that all students should learn how to think autonomously, believe in their creative potential, and express their ideas with confidence and openness to feedback. The democratisation of creative thinking through education will lead to more innovation and will make school more relevant and enjoyable to the next generations. We can no longer afford the alternative. Without creative thinking, we are less inventive, less interested in collaborating with others, less aware of ourselves and the world around us, and ultimately less human.



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Projects, passion, peers and play



ACADEMIC

Mitchel Resnick

LEGO® Papert Professor of Learning Research,
MIT Media Lab

Short Bio: Mitchel Resnick, Professor of Learning Research at the MIT Media Lab, develops new technologies and activities to engage children in creative learning experiences. His Lifelong Kindergarten research group develops the Scratch programming software and online community, the world's largest coding platform for kids. His group also collaborates with the LEGO Group entities on the development of new educational ideas and products. Resnick co-founded the Computer Clubhouse project, an international network of 100 after-school learning centers for youth from low-income communities. He is author of the book *Lifelong Kindergarten: Cultivating Creativity through Projects, Passion, Peers, and Play*.

Twenty years ago, as the year 1999 rolled into 2000, I was asked to participate on a conference panel where we discussed the most important people and achievements of the past 1000 years – and our hopes and dreams for the next 1000 years. At one point, we discussed the greatest inventions of the previous 1000 years. Some people argued that the printing press was the most important invention; others argued for the steam engine, the light bulb, or the computer.

My nomination for the greatest invention of the previous thousand years? Kindergarten.

That choice might seem surprising. Most people do not think of kindergarten as an invention, let alone an important invention. But kindergarten is a relatively new idea (less than 200 years old), and it represents an important departure from previous approaches to schooling. When Friedrich Froebel opened the world's first kindergarten in Germany in 1837, it wasn't simply a school for younger children. It was based on a radically different approach to education, fundamentally different from schools that came before.

**“Success in the future
– for individuals,
for companies, for
communities, for nations
as a whole – will be based
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act creatively.”**

Although Froebel certainly didn't know it at the time, he was inventing an approach to education that is ideally suited to the needs of the 21st century – and not just for five-year-olds, but for students of all ages. I'm convinced that kindergarten-style learning is exactly what's needed to help all students develop the creative capacities that are needed to thrive in today's rapidly-changing society.

Think about a traditional kindergarten classroom. In one corner, children are building towers and castles with wooden blocks. In another corner, children are creating pictures with finger paint. In the process, children are learning many things. As they stack blocks, they learn about structure and stability. As they paint, they learn how colors mix together.

But most important, the children develop as creative thinkers. They engage in all aspects of the creative process: they come up with ideas, create projects based on their ideas, experiment with alternatives, collaborate and share with friends, and iteratively adapt and revise their ideas and projects over time.

Unfortunately, after kindergarten, most schools shift away from this approach. Students spend much of

their time sitting at desks, filling out worksheets, and listening to lectures. Too often, schools focus on delivering instruction and information rather than supporting students in creative learning experiences.

As the pace of change continues to accelerate around the world, the kindergarten approach to learning is becoming more important than ever before. Success in the future – for individuals, for companies, for communities, for nations as a whole – will be based on the ability to think and act creatively. Kindergarten gets children off to a good start. We need to extend the kindergarten approach, so that people of all ages continue to develop as creative thinkers.

How can we do that? In my research group at the MIT Media Lab, we've developed four guiding principles for supporting kindergarten-style learning. We call these principles the Four P's of Creative Learning.

Projects. When children work on projects, they learn new skills and ideas in a meaningful and motivating context. They don't just learn disconnected facts and concepts, but how to put knowledge to use. They don't just learn how to solve problems, but how to find new problems, to shift goals, and to develop new strategies.

✓
Children working
together on
a project
Photo Credit: Michel Resnick





Passion. When children work on things that they care about, they are willing to work longer and harder, and persist in the face of difficulties. Many adults think that children want things to be easy. That's not the case. Children are willing to work hard – indeed, eager to work hard – as long as they are working on things they really care about.

Peers. People get the wrong idea when they look at Rodin's famous sculpture *The Thinker*. Most creative learning doesn't happen when individuals sit by themselves, in deep contemplation. Creative learning is a social activity, with people sharing ideas, collaborating on projects, and building on one another's work.

“I like to think of play not as an activity, but as an attitude, a way of engaging with the world. When children are playful, they are constantly experimenting, trying new things, taking risks, testing the boundaries – and learning in the process.”

Play. Swiss psychologist Jean Piaget famously said that “play is the work of childhood.” I like to think of play not as an activity, but as an attitude, a way of engaging with the world. When children are playful, they are constantly experimenting, trying new things, taking risks, testing the boundaries – and learning in the process.

In my research group, as we develop new technologies, new activities, and new learning environments for children, we're constantly asking ourselves: how can we provide children with opportunities to work on projects, based on their passions, in collaboration with peers, in a playful spirit.

For example, these Four P's of Creative Learning guided our design of Scratch (scratch.mit.edu), which has become the world's most popular coding community for children. Unlike most coding sites, Scratch isn't organized around puzzles or problems for children to solve, but rather around tools to help children create their own projects. Since different children have different passions, we made sure that children can use Scratch to create a wide range of different types of projects: stories, games, animations, simulations, and more. We integrated the Scratch programming language with an online community, so that children can share their projects with one another – getting feedback, suggestions, encouragement, and inspiration from their peers. And Scratch encourages a playful approach to coding, making it easy for children to tinker with their programs, experiment with new ideas, and remix other people's projects.

We also apply the Four P's to our own learning environment at the MIT Media Lab. We like to think of the Media Lab as a big kindergarten. Of course, the graduate students and researchers at the Media Lab use more advanced tools than in kindergarten – more laser cutters and microcontrollers than crayons and finger paint. But the style of work is the same. Media Lab students and researchers are constantly working on projects, based on their passions, in collaboration with peers, in a playful spirit. And we think that's why the Media Lab has become one of the world's most innovative research labs.

The Four P's of Creative Learning work in kindergarten and at the MIT Media Lab. Shouldn't we try to apply them to the rest of the educational system?



Creating the conditions for creativity



GOVERNMENT

Dr. Vicki Phillips

CEO in Residence – Educurious, Former Secretary of the Pennsylvania Department of Education, USA

Short Bio: Driven by a fierce determination to help all students realize their dreams, Dr. Phillips has dedicated her career to national and global education. She has tirelessly championed kids' rights to a high-quality education – as a teacher, state-level policy maker, nonprofit leader, superintendent of a large urban district, chief state school officer, Director at the Bill and Melinda Gates Foundation, and as the CEO in Residence for Educurious.

In addition to a bachelor's degree in education and a master's degree in school psychology, Dr. Phillips also holds a doctorate in educational leadership from the University of Lincoln in England.

One thing I've gained through decades spent in the field of education is the view that a both/and perspective is far more effective in driving impact than an either/or mindset. Either/or is polarizing, forcing one to accept a thought or idea at the expense of another. And when that lens is applied to education, or in this case creativity, it diminishes opportunities for all. In fact, creativity requires either/or thinking. By its nature, creativity is the ability to hold in juxtaposition potentially transformative ideas that others place in opposition to each other enabling more powerful solutions as a result.

The structure of schools constrains creativity. Historically, students have had the option of taking a pre-defined pathway of study, traditionally math and science – or – pathways geared towards literature and the arts. This either/or construct creates unnecessary barriers to creativity. What we need is both/and thinking that allows for the design of a nimble and responsive system that nurtures creativity in our students. If we are to honor creativity in the schooling experience, we need to think boldly, and creatively. Anthropologist Agustin Fuentes states, "People pigeonhole creativity as belonging to a single individual or group of geniuses. They don't realize that each and every human has this incredible capacity to imagine and change things." In fact, the world's problems are so complex it will take a combination of creativity and knowledge to have any hope of seriously tackling those that are most pressing such as climate change, displacement of human populations, and water and food shortages. What could be more motivating for schools to prioritize creativity and knowledge than changing the human trajectory we are currently on?



Here's how we tackle this.

First, we need to have the courage to closely examine and redesign curricular pathways and credentialing policies that hamper creativity. Largely, current course-taking policies in high schools drive a single focus – college prep, Career and Technical Education (CTE) leading to a certification, highly competitive college prep, general diploma – and a single-subject march (math, science, arts, P.E.) resulting in silos and diminishing opportunities for creativity. Those traditionally defined lanes between subjects and courses need to give way to an interdisciplinary approach that views units of studies as connected and networked, just as the world is connected and networked. In the U.S., we flirt with this approach now by combining two courses, such as English Language Arts (ELA) and social studies into humanities or ELA and the arts. This is a step in the right direction, but insufficient. Rather, we need to bundle courses differently – more like dipping paint brushes into different pots to create something new. With innovative thinking and a dose of courage, courses could be bundled in ways that are far more interesting and relevant to students and yet still meet proficiency and credit requirements. Then again, must colleges be the gate-keepers when it comes to what a college-going transcript contains? Is it etched in stone that students must take four years of English as we know it? Or three years of this and that?

In a video produced by the Skoll Foundation that poses the daunting question of what the world will look like in 50 years, Joi Ito, a disruptive technology innovator states, "Once anyone has the power to learn, design, create and participate, it will allow everybody to feel a sense of both ownership and responsibility to each other and to the rest of the world." That collective, creative thinking which draws on imagination and problem solving is what is needed to solve the world's complex and enormous social, economic, and environmental problems that simply cannot be solved by linear thinking. By rethinking and redesigning curricular pathways to reflect the skills required to solve global challenges, students become skilled at combining linear and creative thinking and positioned to be good planetary stewards.

"...we need to provide students with meaningful classroom experiences that enable them to exercise creativity and be integrated thinkers..."

Second, in order to develop and ensure meaningful schooling experiences for creativity we need to think expansively about how to make the borders between grade levels, particularly high school and college, more permeable and flexible. There aren't enough innovative programs that blur borders available to all students. And not just at the high school level. Why not think even more boldly and think without boundaries, teach without boundaries, and encourage young people to think without boundaries at the beginning of a student's educational journey, so it's not a new and different mindset when they get to high school? Starting at the elementary level, we need to provide students with meaningful classroom experiences that enable them to exercise creativity and be integrated thinkers as they enter middle and high school.



Third, when we look at great teaching, it is a balance of both art and science. Students need teachers who are adept at the science of learning and experts in the core content of the subjects they teach. They also need to be perceptive, sensitive, and nuanced in meeting the complex needs that a class of 30+ children brings. To ensure that creativity is a hallmark of the education experience, teachers need the time, training and resources to incorporate those experiences in their instruction. For example, Michigan State University has been researching and developing ways for teachers to integrate creativity into classrooms. They've embedded creative approaches within the disciplinary context and strive to go beyond teaching generic techniques. Their approach is based on a number of principles, including learning a creative mind-set, learning from the best, and linking lessons to the real world.

Think back to a transformative teacher in your life. This can be someone inside or outside of school. Why were they transformative? What did they do – or not do? It may not be because that teacher was soft or kind. There was likely more to it than that. There might have been an edge to your teacher who said, 'You can do this' when you said, 'No, I can't.' That teacher believed in you more than you believed in yourself. That teacher pushed you into places you didn't think you belonged. Great teachers don't just teach you, they change you. And that



can't be done solely through data-driven lesson plans or implementing evidence-based practice. The essence of good teaching lies at the intersection of subject matter expertise and instructional practice combined with the leadership, judgement, and creativity required to meet the diverse needs and challenges of every student. It is imperative we honor the art and science of teaching by giving teachers the opportunity, flexibility and support to prioritize creativity in their own practice, especially if we are asking them to integrate it into the learning experience of their students. A consistent feedback loop for educators, peer coaching, relevant learning opportunities, and a supportive community are strong factors in creating the conditions that will enable creativity skills to be enhanced in the classroom.

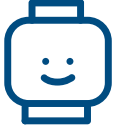
“A consistent feedback loop for educators, peer coaching, relevant professional learning opportunities, and a supportive community are strong factors in creating the conditions that will enable creativity skills to be enhanced in the classroom.”

It's not one thing that we need to do to bring creativity into the learning experience but a balance of both policy and practice that has the potential to create an environment for all kids' creativity to flourish while cultivating knowledge and essential contemporary skills. By addressing this challenge from two ways – from the outside through education policies and from the inside through instructional practice – we alleviate having one entity carry the responsibility for the solution and we increase collaboration between policy makers and educators. And we make learning measurably more exciting for kids.



**“If we are to honor
creativity in
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to think boldly and
creatively.”**

➤ **Dr. Vicki Phillips , CEO in Residence – Educurious**



What is needed to enhance creativity in classrooms?



LEARNER

Karabo Rithuri

Student, University of Pretoria,
Republic of South Africa

Short Bio: Karabo Mmaphefo Gift Rithuri is a 19 year old girl who grew up in a township called Atteridgeville. She was an overall best learner at Bathokwa Primary School, and represented South Africa in the World Robotics Olympiad in 2012. Karabo is known for possessing good leadership skills as she served as prefect and Head Girl at Holy Trinity Catholic Secondary School. When not glued to her books, she spends time training robotics at primary schools in the township she grew up in. She is currently studying Bcom Financial Sciences at the University of Pretoria.

We all have different abilities, thought processes, experiences, hopes and ideals. Classrooms are said to be one of the few places where an individual can realize their full potential. Although there are multiple ways to unleash the creativity of individuals, schools still use the same norms and standards of teaching that they used decades ago.

The traditional way of learning can be viewed as one of the things that hinder creativity and innovation. Not everyone can unleash their full potential from just reading and writing. The variety of talents that everyone has should not be limited to just a pen and paper.

In order to enhance creativity in classrooms, the first thing that should be done is to abolish standardized teaching and testing learners through standard set exams. The way to succeed in doing this is to embrace the fourth industrial revolution by using Artificial Intelligence and technology to enhance learning.

“Learners of all ages want a little bit of fun and play to be incorporated in the learning system.”

Technology can be embraced for personalized learning—enabling a creative and fun atmosphere in classrooms as each learner will get an opportunity to learn and answer differently. By doing this, learners will be able to enhance their way of thinking and approach situations placed in front of them in a different manner.

There's an old saying – "Different strokes for different folks". Different things appeal to different people and not everyone reacts the same to a given situation. Even in classrooms, this is the same case. Not everyone responds the same to the traditional way of teaching. Some learn and remember better from visual learning, whereas others learn better from being hands on. Learners of all ages want a little bit of fun and play to be incorporated in the learning system.

Coding is another way that can be used to enhance creativity because it promotes critical thinking and team work. This method can be a very good investment or a bad one depending on how it is implemented. If implemented correctly, learners will respond in a positive manner and this will be visible through their final product. Coding works like a well-oiled machine, when implemented hand-in-hand with robotics. Coding and robotics not only enhance creativity, but can also push learners to think outside the box. By outside the box, I mean out of the ordinary. Learners are able to shift their attitude and mentality from that of aspiring to create something average, to wanting to create something that is one of a kind and out of this world.

By introducing different scenarios to learners, creativity comes naturally, because not everyone is going to respond in the same manner. Some will give an expected answer and reaction, while others will dig deep and go the extra mile so that their response can be remembered for many years, if not days to come. Coding and robotics allows learner to push themselves, forcing them out of their comfort zone.

When I was in primary school, I was an average achiever. There were certain subjects that I hated because no matter how hard I studied, I just could not pull through. I used to be one of those learners who would say to themselves, "What am I doing wrong?". Subjects like Mathematics and Technology used to kill my mood whenever I thought about school. Then they introduced coding to us and I had a complete change of mind and heart. This introduction to our education system has contributed a lot to the change of heart I have had towards these particular subjects. I had a complete change of mind because I took on these two subjects, which I hated, head on and came out victorious. I got to a point whereby I saw them as scenarios that needed to be solved and ended up loving them. Not only did I become a top achiever, but I became a top achiever with top results because of the fun and play which enhanced our way of being taught in classrooms.

Students need to be exposed to something that drives them to excel because people who are driven go out of their way to be creative. When learners are out of their comfort zone, they are able to go the extra mile, able to dig deep and able to take risks if push comes to shove. I feel as though schools are not doing enough to enhance creativity – learners need more incentives to push them

out of their comfort zones. I feel as though they should be exposed to real life situations or be put in scenarios or role plays, whereby they can apply what they are taught. This way, they are bound to be more motivated to be creative and innovative.

Overall what I am suggesting should not be seen as outlandish. I know that not everyone will be able to relate to this and understand, except for a learner who feels like they are worth no more than 80% or 20%. Or the learner at the back of the classroom who is wondering, "Why am I studying something that does not inspire or engage me? Why am I not like the other children? Why am I always average?" By introducing more play and focus on creativity skills into our classrooms, a learner can become engaged and inspired to learn – their eyes will come alive when confronted with mathematical or technical challenges!

To enhance creativity, it all starts where one's heart is. Stop with the norm of "learn every subject to the test" as this hampers our ambition, motivation, and destined excellence.

"Although there are multiple ways to unleash the creativity of individuals, schools still use the same norms and standards of teaching that they used decades ago."





How can play and other techniques be used to enhance creativity in classrooms?



TEACHER

Andria Zafirakou

Associate Deputy Headteacher,
The Alperton Community School

Short Bio: Andria Zafirakou is the recipient of the 2018 Global Teacher Prize in recognition of her contribution to education. She is art and textiles teacher in Brent on the outskirts of London, one of the world's most ethnically diverse places. She is passionate about education and changing the lives of young people and under served communities through creativity. She recently launched the Artists In Residence charity "AIR" to redesign the profile of arts education in the school curriculum and inspire school children by collaborating directly with various artists.

If I was to ask you to take a trip with me down memory lane and to recall a moment from when you were in your early years, I wonder what your responses would be?

The first question I would ask, for example, would be, "As a child, can you recall what your best ever lesson experience was?" I would then ask for you to describe to me what the lesson was about and how it differed from all your other learning experiences. I would listen to you and you would describe in great detail the location of the lesson, the teacher and your relationship with them, who you were with at the time, the format of the lesson and what happened that made this the best learning experience that you can still recall. I can also predict that the reason why this was your favourite learning experience was that it had an element of fun, where you were able to explore, make your own decisions, experiment, question, socialise, use your imagination and collaborate. In other words, it was when you were given the freedom to play and experience creativity.

The power of learning through play and through being creative during your school years is often underestimated, especially as you mature in age. In schools, play is an essential tool used to nourish and develop the softer skills, such as communication and wonder. They are also key factors in assessing the development of children in the early years of education which produce the foundation for all other learning to take place. For many, once we get older, the opportunity to be creative and playful is often reserved for the weekend!

So what is "play?" In my opinion and in a nutshell, play is the opportunity to explore, to imagine and to discover, and only when you are frequently exposed to play can you learn how strong your creative nature is.

As an Art teacher, I am fortunate to be surrounded by creativity and I am an active advocate for it with my students in my lessons. I help young people get excited about being creative and to feel comfortable in using it within all aspects of their life. I want to help guide young minds to undertake journeys of self-exploration, develop ideas and to help them learn new skills. I often teach them this by using methods to unravel their creativeness through their work. An example could be when I ask my Art students to consider their choice of surface, scale and materials for when they are planning their outcomes. "Why have you chosen to use white paper?" or "What objects other than a paint brush have you tried to apply paint with and what effect did they give?" These simple prompts help them to pause, reflect and consider changing the course of direction with their work.

"One thing is for certain, we need to make drastic changes and to continue our advocacy of creativity in all classrooms, so that our school systems and teachers are confident to explore them."

My classroom is an environment where students are challenged, experience accomplishment, but most importantly, experience joy and an understanding of oneself. Enabling children to experience environments where joy and happiness are promoted through the exploration of play, help to secure deep and strong learning habits that are ultimately good for the soul too!

In my opinion, one of the greatest skills that being playful develops in a young person is the ability to feel comfortable and confident and to make mistakes or to fail. This is achieved when the experience of play is carried



out in a safe environment that removes and discourages the pressure for individuals to feel that they are doing something that is deemed wrong. We all know the saying "We learn best from our mistakes," however, ironically, we do not encourage this enough in our schools and as a result we frequently reflect upon this quote once we are older.

The demands placed on our school curriculums to be mainly content driven enables little opportunities for our teachers to create environments that enable their students to want to frequently be exposed to situations where they are comfortable to fail. As a result, they miss out on the extraordinary and very personal learning journey of reflecting and learning from that mistake. When we were toddlers, the way we initially learnt how to walk was mainly by exploring the learning process

of falling. I believe that we need to try and be more flexible in our schools with the allocation of time and be more patient, to enable our students to learn more in this exploratory way.

In addition, I am not entirely convinced that educational systems are equipped and empower their teachers to use creativity as the core tool to facilitate learning in the classrooms, especially in the

Secondary setting. There seems to be a fear for schools to undertake the creative style process of learning and they instead promote the traditional didactic techniques where success is defined through the quantity of knowledge that one can retain. Successful teachers of any subject and age group acknowledge that creativity is a key element required to engage their students in learning. When lessons and classroom environments are designed to encompass the student's ability to imagine, reflect, persevere, investigate, explore and develop, these are the lessons that really make the difference and help secure knowledge and understanding.

Due to the development of technology, particularly through the use of search engines, we can now access the knowledge of the universe in less than a second, thus, this is the time to really think about how we are preparing our children for the future. Do we need to start thinking about what skills we want our students to have greater exposure to, or what skills to teach them to enable them to gain more confidence? One thing is for certain, we need to, make drastic changes and to continue our advocacy of creativity in all classrooms, so that our school systems and teachers are confident to explore them. After all, creativity is a rich and beautiful individual human trait that all individuals have. For some of us, it has been embedded and is secure. For others it may not have been exercised throughout the years and as a result, we need to reignite our power of play.

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About the editor

Ryan Gawn is Director of the LEGO Foundation, where he leads an advocacy initiative seeking to inspire and enable policy-makers to increase focus on creativity skills within education systems.

About the LEGO Foundation

The LEGO Foundation shares its overall mission with the LEGO Group – to inspire and develop the builders of tomorrow. This demonstrates our shared heritage and values, and is the guiding star for everything we do.

The LEGO Foundation aims to build a future in which learning through play empowers children to become creative, engaged, lifelong learners. We are dedicated to re-defining play and re-imagining learning to ensure children build the broad set of skills they need to navigate a complex and ever-changing world.

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THANKS



The Creativity Matters series aims to highlight not just why creativity matters, but how education systems can best adapt and reimagine learning to equip today's and tomorrow's learners with creative skills, mindsets, and confidence.

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