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INSTITUTE

HOW KIDS LEARN

Opinions, perspectives, research…
Views from a conference

Tmrw Institute
Ascot Racecourse

28th – 29th September 2019

Writings for How Kids Learn is the result of the contributions that participants of the conference have submitted prior to the event. The Tmrw Institute will publish a paper after the conference, which will use these contributions and the conference itself as a reference.

We are extremely grateful for all contributions to this conference paper, which we wanted to produce without a set style or guidance, nor a rigorous editorial process. In short, we have taken your perspectives, opinions or research relying on *your own words.*

Kids learn through…..

Happiness

Opportunity

Wonder

Kinaesthetic

Independence

Differentiation

Struggle

Leadership

Engagement

Accomplishment

Recall

Navigation

By Andria Zafirakou

Introduction

Carla Aerts, *Director, Tmrw Institute*

Understanding *How Kids Learn* presents us with a rather *kaleidoscopic* question, not only depending on who is asking the question, but equally on why, how and where the question is being asked, not to mention what they are learning.

Learning is a complex phenomenon as the learning Sciences i.e. neuroscience, cognitive and developmental psychology, pedagogy and human-technology interaction design demonstrate and educators, parents and learners clearly corroborate.

How kids learn raises an increasingly important question. We live in a world of growing complexity with (r)evolution in science and technology moving at exponential speed. The relationship human-machine is taking us into new dimensions that have never been ventured into before, are not understood and difficult to fathom. Yet, this is the world children live in, play in, grow up in and learn in.

Learners and teachers still tend to live and learn in modes of education developed for the needs of the Industrial Revolution, based on instruction models that didn't exactly equip learners and teachers to construct and understand their own learning, nor realise their own potential. These front-of-class instructional approaches strived for a one-fits-all and standardisation, often leaving little room for play, exploration and collaboration. More recently, rather than focusing on the act of learning itself in a social relationship with teachers and peers, education has been subjected to a growing appetite for measuring and focusing on meeting targets. However, such pedagogies are unlikely to provide learners or teachers with the skills, aptitude and knowledge they need to navigate and tackle the complexities of our world nor the challenges of tomorrow.
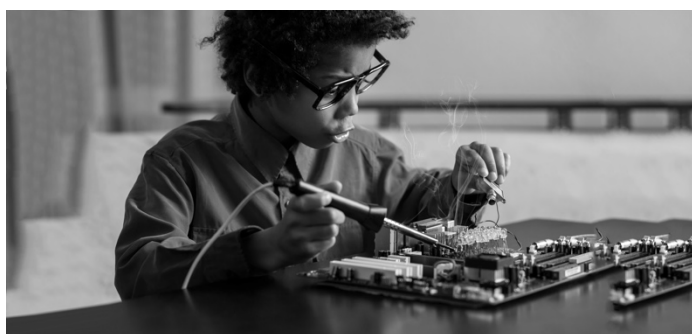
Moving into a world of fast-evolving technologies, EdTech, online gaming, AI and machine learning, which are starting – albeit it rather slowly - to make inroads in learning and education, new modes and Human-Machine-Collaboration-Pedagogies (HMCP) or Human Machine Pedagogies (HMP) will need to be developed and implemented.

For new pedagogies and andragogies[1] to flourish, education can no longer blindly continue on what worked in the past but needs to look at education for tomorrow, based on gaining insight in learning, learning modalities, learning environments and contexts. This will require new policies, designs and environments for learning in which teachers and learners can play, thrive and construct, understand and *own learning*.

"*How kids learn*" is not a binary question. The question is a multi-faceted one that we can no longer avoid engaging with and delving into. This conference will do just that.

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[1] The method and practice of teaching adult learners

How Kids Learn in the Context of the Philippine Education

Professor Emeritus Leonor Magtolis Briones, *Secretary, Department of Education*

As of today, the Department of Education (DepEd) is facing two challenges at the same time: catching up with the changes brought by the 21st century and heeding the call of communities from the country's geographically isolated and disadvantaged and conflict-affected areas. It means that while some learners are already learning how to use the innovations of the 21st century, there are still learners who are deprived and do not have access even to basic learning resources.

The stark contrast plays a significant role in how Filipino kids from low-income families and high-income families learn. Learners from high-income families enjoy more access to learning resources such as books and the internet as compared to learners from low-income families. Moreover, learners from low-income families have lower academic performance due to deprivation, and their stressful learning environment with factors such as hunger, lack of funding for their education, health concerns, and lack of support from parents.

Kids learn differently then and now. The education system then was teacher-centric and followed the "banking concept of education," as described by Paulo Freire. Now, the education system is shifting to a new pedagogy of teaching – the collaborative approach. This new approach is student-centric which encourages learners to work and discuss together as a group and develop critical thinking. Also, with the emergence of the 21st century, learning has transcended beyond the classroom through e-learning.

The way our kids learn has evolved and developed since then. The Philippines, through DepEd has also been implementing various programs (K to 12 Curriculum, Inclusion Program, and the Last Mile Schools Program) in order to address the gaps, and the demands of learners from low and high-income families.

Right now, countries should prepare themselves for the innovations and challenges brought by the 21st century and the fourth industrial revolution – the rise of artificial intelligence and robots, the uncertainty of the job market – which might significantly improve education systems, or worse, widen the education inequity gap, posing a threat to the future of our learners and teachers. Governments across the world should close these gaps between the quality of education learners from high-income families receive, from those learners coming from low-income families by instituting sound policy reforms. Lastly, governments should ensure that no single individual – may it be from the wealthiest family, or the most impoverished family in the world – will be deprived of their right to quality education.

Pratham's journey

Dr Rukmini Banerji, *CEO Pratham Education Foundation*

Pratham believes that every child should be in school and learning well. In the initial days, much of our work was with bringing to school children who had been "left out". But in the last twenty years we have focussed largely on children who are "left behind" – children who are in school but well behind where school expects them to be. Our goal is to help all children acquire foundational skills like reading and arithmetic well before they leave primary school.

In our journey, we have learned many lessons. Simple visible goals are essential. Goals help us to see where we are headed. Children like to know this too. Engaging activities done in a variety of ways is a big plus. Activities in big groups, things to do together in small groups, individual tasks – combination of activities helps to maximize learning. Showing children what to do and then allowing them to try it out on their own, knowing when to help, when to step

away and watch and when to push is what a good teacher does well. Children love to see and feel their own progress. Learning to read is like learning to ride a bicycle. Suddenly you are not falling any more. Everyone can see that you are able to do it. Reading too is like magic – one day it all comes together. When a child has learned to read, she wants to read everything and wants everyone to see what she can do. Even a light pat on the back and a proud smile from parents or teachers can go a long way in making a child feel special and unique. It acts as a fuel for wanting to do more. Everyone around children must genuinely believe that every child can learn. If that is the case then we have to make every effort to make that happen. Children learn everywhere – not just in school or at home. The world provides endless opportunities for curiosity and exploration.

"Schooling for all" happened because parents and communities, policymakers and governments, all believed that this was an important goal and worked together to make it happen. We need a similar common understanding and commitment for every child learning well. Learning for all means learning with all - everyone to engage, to participate, to experiment and to feel proud when children are learning.

The Virtual Classroom in 2025: How Digital Evolves

Ed Barton, *CEO and Co-founder Curiscope*

Advocates of technology in the classroom often argue that it needs disrupting, but I'd rather see an evolution; one that looks to enhance the experience of the teacher and the student without flipping the environment on its head.

The evolution of digital will be about a deeper integration between technology and the world it exists within. In 2019 technology interactions are siloed, occurring for a set period of time on a set device. Right now, the digital and physical worlds exist independently of one another.

The interactive whiteboard represented the first step towards a vision of the virtual classroom; a digital version of a traditional tool embedded on the wall. But it's a limited initial step. The future of Augmented Reality, I believe, will fulfil this vision fully.

Augmented Reality will serve the classroom so beautifully because it won't seek to disrupt or change the environment, nor will it need expensive new hardware, working on the tablets that are already in use. Right now, we're at the genesis of AR and most interactions feel limited and single-use. But with the rapid enhancements in computer vision, we're rapidly approaching a point where basic hardware is able to fully understand the spatial environment and transform it into a digital canvas.

With this, digital interaction will be possible across the entire classroom environment. Transform the classroom into a history scene, or a chemistry lab or a rainforest, leave digital items in physical locations, work on collaborative art pieces over time, load, save and share classroom set-ups within a school or across classrooms across the world. It is digital transformation in its truest form.

The virtual classroom won't look that different from what we have now but viewed through devices, we'll have learning experiences that were never possible before, generated on a global scale.

Kids Must Fail: How Embracing Playful Failure Can Help Empower Tomorrow's Changemakers

Ayah Bdeir, *Founder and former CEO, littleBits*

Ten years ago, almost to this day, I debuted a prototype of a product at Maker Faire 2009 that transformed my life. The prototype was of littleBits: small electronic building blocks that snap together with magnets to empower kids to learn and invent with technology. The prototypes were handmade, they were falling apart, I had to jiggle them to make them work. I felt like a fraud showing off a faulty concept. By end of that day most prototypes had broken, and my demo had failed. I was devastated and embarrassed.

Over the next 10 years, that faulty prototype would become one of the leading education tech companies, with a reach of over 2 million kids, 15,000 schools, integrated in hundreds of curriculum programs around the world and with over 150 awards in education and design. A few weeks ago, littleBits was acquired, and as I reflect on one of the most pivotal lessons in my journey as an entrepreneur, it all started that of that day of epic failure.

We are leaving kids a world full of large challenges: social, political, financial, environmental, I believe it is the responsibility of makers of education technology to support educators by creating tools that help them inspire kids to be fearless, to be comfortable with failure and to be creative so they can invent the world they want to live in. In short: too comfortable to fail.

Silicon Valley celebrates the ideology of failing fast: innovate incrementally, measure success often, and embrace failure as a motivating factor. Yet kids often get a different message at school and at home: failure means they will not succeed in life; failure will reflect on what they are capable of. Research shows [kids are becoming anxious](#) and worry they are disappointing their parents. This is extra pronounced with girls, who [interpret failure differently](#) than boys.

Playful Failure is an experience design concept we came up with in 2016 when we were testing a STEAM kit. The kit was causing kids to panic and cry, and an investigation showed us many children were so used to following directions and putting together puzzles where there was only one right answer that when faced with an open-ended problem, they worry that they are failing and give up.

We coined the term Playful Failure to combine two ideas we believe are key to learning: play and failure. It is only ok, and fun to fail but it is the basis of the engineering method (also the scientific method and the design thinking method) — fundamental to being changemakers in the world.

We are countering a whole industry that talks down to kids and treats them like they don't understand complex ideas. Designers, technologists and creators have the responsibility to support educators in this big

challenge. We have the opportunity to design failure into our learning experiences, expose kids to failure early and often, get them comfortable with not accepting the state of things as final, of helping them be resilient. It shows them how to be resilient— we unfortunately all know they are going to need it.

Culture and language: foundations of learning and development

Dr Eva Chen, *Associate Professor, The Hong Kong University of Science and Technology*

From the moment we are born, our lives are shaped by the cultures in which we live and the languages which we hear and learn to speak. Children are capable of communicating with their adult caregivers, even in infancy and begin learning from others at an early age. However, they are not indiscriminate learners; rather, children attend closely to the characteristics of their potential teachers, trusting those who appear to be accurate, those who have achieved consensus with others, and those who are familiar to them. In my presentation, I will briefly review what child development researchers know about young children's selectivity in trust, focusing on my own work on pre-primary school children's preferences to trust in those who belong to the same cultural groups as themselves. I will also discuss additional literature that has demonstrated children's sensitivity to the language (or languages) they hear, highlighting the importance of children's language development for their cognitive development, cultural understanding, and later academic achievement. In the early years—particularly from ages 0 to 3 years (when many children typically enter into a formal schooling system)—children's linguistic and cultural experiences often form the foundation for their future success in life.

Kitkit School: Literacy Through Self-Directed Learning Software

Eugine Chung, *COO - Enuma*

This May, after a 15-month long randomized control trial study with 3,000 children in remote villages of Tanzania, Enuma's Kitkit School was named a co-winner of the Global Learning XPRIZE competition for attaining the highest learning gains. Kitkit School proved to the world that even in extremely under-resourced environments, children who do not have access to schools nor adult support, can teach themselves how to read, write, and do basic arithmetic with a tablet with a well-designed software.

Kitkit School is a tablet-based comprehensive self-directed early learning program, grounded in accessibility and UDL[2], designed to provide children with the foundations and practice needed to build fundamental skills in literacy and math, spanning pre-kindergarten to 3rd grade.

The team's experience from the gaming industry led to a unique design approach that sharply focuses on the child's experience, prioritizing their short-, mid-, and long-term engagement with the goal to keep them motivated, experience success, and enable them to independently engage.

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[2] Universal Design for Learning

Going forward, Enuma will continue to improve Kitkit School based on the play data, add management/assessment tools, and expand its language offerings to reach the children who need it most around the world. New developments in the pipeline include:

- The **English as Second Language (ESL)** version, which includes language development curriculum, ESL resources, and conversational activities.
  - Through a partnership with IRC and Imagine Worldwide, for Rohingya Learners with Rohingya language instruction.
  - With Good Neighbours, for Rwandan Learners with Kinyarwanda language instruction.
- **Additional Languages and Localization Efforts**
  - The **Korean** version for underserved children from immigrant families in South Korea. This version supports text translation into four foreign languages (Chinese, Vietnamese, English, Thai) while teaching basic Korean literacy to help Korean language learners' school readiness.
  - The **Spanish** version to reach children in a variety of educational contexts throughout Latin America, starting with Spanish speakers.

Recommendations for public policies for Brazilian basic education to take a big quality leap
Why Education Matters?

Priscila Cruz, *CEO, Todos Pela Educação, Brazil*

Education is a fundamental right. It is also one of the main transformation forces of an individual and a nation as a whole.

Structural changes are needed in order to transform the reality of Basic Education in Brazil. A move in this direction is what we propose with **Educação Já! (**Education Now!), a cross-party effort led by Todos. It lists **evidence based public policies recommendations** that, once implemented in a coordinated way, **can make Brazil raise a new level for public Basic Education**.

7 Education Policy Recommendations for the Federal Government 2019-2022
1. Restructure the governance rules of the educational system by creating a National System of Education and launch a new policy to support the improvement of the quality of management on all levels.
2. Promote legal changes in the funding system of basic education, making them more efficient, redistributable and quality-inducing.
3. Provide support to state and municipal systems in order to advance with the implementation of the national common core, guaranteeing the provision of essential pedagogical resources and programs across all school systems.
4. Institute a national policy to strengthen the teaching career and training, which will initiate a profound redefinition of the career and of the initial and continuing teacher training structures.
5. Improve the national literacy policy, with the induction of a system of collaboration among governments of the states and cities as the premise of federal action.
6. Coordinate and support the states in the implementation of the new high school model, improving the policy of fostering the expansion of the school day and professional training.
7. Institute a national intersectoral policy for early childhood, articulating, among others, education, health and social assistance.

How Teachers Learn

Lucia Dellagnelo, *President and CEO, Center of Innovation for Brazilian Education (CIEB)*

The promise of technology to improve education can only be fulfilled through comprehensive educational policies that include four different dimensions: a clear vision on how technology can create innovative pedagogical practices and curriculum, *the development of teachers digital competencies*, high quality digital educational resources and school infrastructure (connectivity and devices).

The dimension relating to the development of teacher´s digital competencies is particularly challenging. Although there is a growing body of knowledge on how technology can enhance students´ learning, little is known about the potential of technology to promote teachers´ learning and professional development. Understanding what teachers need to know about technology in terms of integration into pedagogical practices, digital citizenship and for professional development is crucial to create learning experiences to develop teachers´ digital competency.

The Centre of Innovation for Brazilian Education-CIEB has developed a conceptual framework and tools to help school systems to map teachers´ digital competencies and to create effective learning strategies for teachers´ professional development.

Based on an extensive benchmark of teachers´ digital competencies CIEB created a matrix with 12 competencies organized around three main dimensions: pedagogical, digital citizenship and professional development. This matrix generated a self-evaluation tool to assess teachers´ level of competency and to provide personalized recommendations on how to advance it. The data is then aggregated to inform educational state and municipal departments about the kind of content, level of complexity and target group of professional development programs on the use of technology they should offer.

CIEB also developed a prototype of a professional development program, including innovative methodologies and a facility called EfeX (Spaces of Training and Experimentation) where teachers can learn by collaborating with peers and by experimenting the use of technology in their teaching practices.

The study Schools for 21st-Century Learners (OECD, 2015) states that "teachers´ self-efficacy, their belief in their own capacity to make a difference, is a pre-requisite for improving professional practice and student outcomes". Unless we strengthen teachers´ digital competencies is unlikely that technology will deliver its promise to offer a more innovative environment for kids to learn.

MentalUP: Educational Games for Kids' Learning

Resit Dogan, *CEO MentalUP*

MentalUP develops educational mobile and web games-based learning (GBL) for 21st Century skills for K12 students with 100+ memory, attention, logic, verbal, visual, math, speed and emotional game exercises with 2000+ levels, developed by child development specialist, academicians, and professional game designers. MentalUP has already reached more than 3 million students across 60 countries.

Research shows that individuals starting mental skills at a young age are successful in their academic and social life and they are happier. With this scientifically supported idea, by pointing that "Children are our future" and using scientific and technical expertise, we developed the MentalUP Educational Games project.

Consisting of 100+ entertaining exercises improving learning skills of 5-12-year-old children, MentalUP addresses the first AI/Analytics and third areas of need with an out of the box games-based solution that makes learning fun with a data-led approach to understand learner progress and performance. We're raising standards of efficacy research, rooted in cognitive learning theory for skills development by offering robust methods to test and demonstrate understanding of and attainment of skills.
User data of 3 million students that use MentalUP in the database helps provide a personalized improvement program for each student with unsupervised classification deep learning algorithms.

MentalUP turns children's screen time into a fun-filled educational adventure. It aims to improve the mental health of children while having safe, ad-free fun and improve performance of lessons and learning.

MentalUP has a pedagogical product certification and participated in University College London's Institute of Education EDUCATE Programme, receiving an EVIDENCE of IMPACT Award. We provide multi-language support including English, German, Turkish, Arabic, Hebrew, LATAM Spanish, and LATAM Portuguese, alongside intuitive, comprehensive reports to help parents discover their children's strengths.

We help schools, parents, and students assess students' strengths and weaknesses to determine the kind and level of necessary support as well as give insights to orient the children to appropriate subjects and programs. MentalUP's database provides us with granular and rich information to support Kids' Learning.

Our USPs:

- Educational exercises develop cognitive skills and boost school success.
- Strengthen memory skills.
- Improve concentration skills and attention disorders.

Shaping the future

Dr Melina Furman, *Associate Professor, Universidad de San Andrés, Buenos Aires*

Imagine the children starting school today … What would you like them to be like as adults?

I have been doing this thought experiment for some time now and getting similar responses from people all over the world. We want future generations to be curious, critical thinkers and independent. We also want them to be team players and life-long learners.

How should we educate our children today in order to plant the seeds for that future? I ask this because education isn't neutral. We are always either educating towards our goals, or in the opposite direction, accidentally developing apathetic, uncritical and dependent grown-ups.

Fortunately, we know a lot about how to teach for understanding and spark a love of learning. We are aware that content needs to be meaningful to students. We know about the value of teachers´ high expectations and careful scaffolding. We know that pupils need

to reflect on their own learning. Over and over, research has confirmed these ideas about the nature of effective teaching and learning.

What we don´t know yet, I believe, is how to make these good teaching practices a part of everyday classrooms. In many parts of the world, today´s education is still far from what we would like.

Yet, there are also examples that show us that change is not only possible but scalable. From phenomenon-based education in Finland to high expectations teaching in the American Uncommon Schools network. From the public-private school movement Nova 21 in Spain where pupils work to develop interdisciplinary projects, to the Tutor Networks program in rural Mexico where children learn by teaching one another. These are just some examples of good practices in action that show, perhaps more than ever, that the education we dream about is closer than we think.

Towards the hybrid specialist

Prof. Carl Gombrich, *Academic Lead and Head of Teaching and Learning,*
London Interdisciplinary School

There is a revolution in science and technology underway. This requires us to educate hybrid scientists, technologists and engineers in the humanities and social sciences, so that they understand the implications of their work for humankind, and also to educate hybrid humanists and social scientists so that they understand the importance and implications of scientific advances. And yet many curricula and entire institutions still find it challenging to properly conceive of and implement interdisciplinary learning. This talk will examine some of the background to our current situation, explain why interdisciplinarity is of increasing importance and examine how students can benefit from an interdisciplinary education. The talk focuses mostly on higher/tertiary education but the implications for schools and school curricula are also considered.

The influence of policy on primary school kids' learning

Dr Eleanore Hargreaves, *Reader in Learning and Pedagogy, UCL Institute of Education*

Our research project develops Children's Life-histories In Primary Schools (C.L.I.P.S.) over five years, to explore how the recent policy of "attainment-grouping" influences the learning of children placed in "lower-attainment" groups by their teachers. During the 1970s and 1980s, primary curriculum contents and pedagogies were decided at local, not central government, level in England. When a National Curriculum and Assessment became law in 1988, children abruptly became categorised according to their 'attainment' in these National Assessments. Ofsted inspectors in the 1990s now required categorisation of primary-school pupils as 'high', 'middle' or 'low' attainers in selected subjects, thereby linking children's worth directly to their attainment (Hart, 1998).

Attainment-based grouping was officially – and mistakenly - encouraged on the grounds that it advanced pupils' '*motivation, social skills, independence*' as well as academic success in national tests. According to policy documents, students in segregated "ability" groups became '*more engaged in their own learning*' (DfES, 2005, p.58). These policy-directives led primary-schools to construct classroom 'attainment' groups (misnamed 'ability groups'). Sorting by attainment has – again mistakenly - come to be seen as natural and efficient (Francis et al., 2017), whether this sorting is done in the teacher's head or by physical placement of pupils.

Our research project asks what happens to children's social, emotional and cognitive well-being when policy designates them as lower-attaining. Previous research (Francis et al., 2017) suggested that their self-confidence could be permanently damaged, leading to a downward cycle of poor performance and negative attitudes towards learning and schooling. Our own research supports these findings and perceives "low attaining" children coming to feel socially isolated, powerless, and in some cases, subordinate (see Hargreaves, 2019). A clear symbol of subordination is the physical form of the low-attainment group itself, where children are physically as well as cognitively and socially separated from the rest of class. This sometimes leads to children pretending, withdrawing or behaving disruptively in class, none of which are likely to support their full participation in the culture of learning and schooling.

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How Kids Learn by Ubongo Learning

Doreen Kessy - *Chief Business Officer and Chief Operations Officer at Ubongo Learning*

Sarah is the 3-year-old daughter of one of Ubongo's employees and comes to the office with her mother almost every day. We've watched her grow from a little baby to the active toddler who likes to play, draw, run around the office and ask lots of questions. She's always been outgoing, confident, and curious. However, all of this changed when she started nursery school. The once inquisitive and kind child became aggressive, needy, and began to throw tantrums.

In Tanzania and most parts of sub-Saharan Africa, many schools view playing as disruptive and bad behaviour that needs to be corrected rather than encouraged. However, playing is critical to social-emotional and cognitive development. In the first years of life, playing with children helps them begin to understand and develop communication skills, language, and motor skills. As they get older, it helps strengthen memory, reasoning skills, and builds cooperation.

Currently, it's estimated that over 44% of children below the age of 5 in sub-Saharan Africa have under-developed social-emotional and cognitive skills. This is tied to delinquency, unemployment, and lack of empathy in adulthood. However, stimulation through meaningful play can help children who are falling behind developmentally.

In sub-Saharan Africa, most children under the age of 5 spend the majority of their time at home with caregivers. So, if we can get caregivers to understand the importance of learning through play in early childhood, then maybe we can start to fill the developmental gap.

At Ubongo, in addition to creating edutainment for children, we also develop content that gives caregivers the resources to help them foster the physical, emotional, and cognitive well-being of their children. We've found that there are 3 critical steps to positive caregiver engagement:

1. Understanding what motivates caregivers, through human-centred research.
2. Meet parents where they are at:, using technologies they already have access to.
3. Collaborate with partners who are already working with parents i.e. teachers, health practitioners, adult-learning institutions, and other programs that are directly interacting with parents.

Many people in the education and innovation field are concerned with how we can help kids be more creative, however, the real problem is that we socialise children out of creativity by not valuing important developmental tools like playing. At Ubongo we believe that every child is born with magical potential in them already, it just needs to be nurtured. However, this cannot be done without support from parents, who are our children's first and most important teachers.

Today's schools for our children's future

Christopher Khaemba, *Co-founder and Director, Nova Academies, Kenya*

Children in early years of school today, will be young adults in 2030. They will confront a World of work that is very different from that obtaining today. It will be a world with scarce natural resources, with challenges that cannot be fathomed today and with technologies that have not been invented. Schools of today should prepare kids for their world of adulthood. The appropriate learning should be of the kind that will enable kids to explore more, dig for information and do research to obtain solutions.

It is against the above realization that we at the Nova Pioneer determined to have schools that prepare students to become innovators and leaders. Innovation will be key to the children to not only survive in their adulthood but also thrive by meeting and overcoming the challenges they will confront; it is possible that by 2030 artificial intelligence (AI) will be everywhere. In construction industry, assembly lines and other manufacturing firms, communication facilities, etc. Jobs as known today will therefore be non-existent. Children should today be put in an environment that prepares them for the World of 2030. Global curricular ought to allow for the learning that is enquiry based, that encourages innovation.

At Nova Pioneer we seek to achieve the above through six cultural principles of Servant Leadership, Solutions First, High Expectations, Joy of Learning, Greater Together and Always Growing. Pupils aspire to radiate these

principles as they are at the centre of learning- with teachers guiding the learning, as opposed to controlling the learning.

How kids learn represents my philosophy on education that underpinned my 30 years of work in public and private schools and eventually led to founding schools for innovators and leaders targeting kids.

How assessment can help childrens' learning

Simon Lebus, *Chairman Pamoja Education*

Neuroscience has enriched our understanding of how kids learn and technology has created new tools to help them do so. At the same time much of the focus of *what* kids learn has shifted with more emphasis now on skills.

Amidst this change, however, the central role summative assessment plays in most education systems has remained largely unchallenged (if much grumbled about); arguably, indeed, that role has become even more salient as schools and education systems find themselves subject to ever greater levels of external scrutiny and accountability. One consequence has been the evolution of an increasingly instrumental approach to education which in turn discourages risk taking and innovation, stifles discovery and discourages deep learning.

How can this be countered?

Whatever happens, assessment will continue to play a critical role in helping to define the curriculum, establish pathways through it and in providing recognition of student mastery of it. The challenge, therefore, is to ensure that that influence is generally benign, something that is difficult to achieve given that high stakes assessments continue to serve as the main gateway through which young people have to pass when progressing onto the next stage of their education or into employment.

There is no single solution to this, but some recent developments look encouraging. In particular, the technology behind the increasing use of interactive and adaptive digital content for learning affords the opportunity to sample and record a student's progress as they learn, in a much less intrusive way than high stakes exams, and it is possible to visualise this eventually taking over much of the current role of summative assessment. Technology platforms also provide scope for collaborative activity, project work, peer assessment and other approaches that substantially enrich the learning process and help foster the development of those skills identified in the OECD 'Learning Framework 2030'.

The key challenge in developing a new system out of this will be to ensure that equity is not lost nor public trust forsaken and that the quantum of investment required does not in turn create new inflexibilities and barriers to change. If that is achieved it will substantially and irrevocably change the learning landscape.

Digital or unplugged educational tools?

Dr Stéphane Magnenat, *Deputy Scientific Director – Game Technology Centre - ETH Zürich*

Nowadays, digital technology is omnipresent, and the fields of intelligent tutoring systems and augmented reality promise to open a new realm of learning opportunities.

At the same time, following studies showing decreased learning skills for children spending too much time on digital devices, an increasingly large number of parents are worried about this pervasiveness and wish to restrict their children's access to digital technology.

How to reconciliate these two trends?

Based on our previous work in educational robotics with the Thymio mobile robot and in the field of augmented creativity (that is, using augmented reality along with a physical component to promote children's creativity), we believe that there exists a synergy between these two approaches.

We believe that the physical world should be used as learning environment as much as possible for the specific features it provides: richness of interaction, focus of attention, availability for others.

On top of that strong tangible base, the digital world can provide immense contributions in terms of real-time educational feedback, contextualised aids, and persistence of progress, among others.

For example, in the field of computer science education, there is a trend of using "unplugged" embodied activities to present computing concepts, that is, without a computer.

While this allows to explore some of these concepts with pen and paper, this approach fails at delivering any insights into key concepts, such as modularisation through the reuse of programming constructs, early feedback through automatic program validation, or tracing support through interactive debugging.

In turn, this lack of support is likely to let down all children but the most advanced ones, betraying the promise of bringing computer science education to all.

Hence, we believe that the future of educational technology lies in the intelligent use of digital capabilities to scaffold and accompany the learning in a non-intrusive way.

Blended Learning

John Martin - CEO *Sanoma Learning*

Finland has a world-class education system with several factors underpinning the success including great teachers and a holistic view of children. I believe that blended learning is an enabler of excellence in Finnish education.

1. Blended learning plays to the strengths and available resources of the local education system, enabling excellent teachers, taking advantage of the high-quality materials and putting to work the technology where it's available.
2. Blended learning models are practical and flexible as schools transform to a more digital future. Our research indicates that teachers are increasingly ready for digital. We're also witnessing the emergence of new pedagogies such as phenomenon-based learning, and blended solutions can be very helpful enablers of them.
3. Blended learning supercharges great teachers. A Sanoma Learning solution typically saves a teacher about 8 hours of working time each week – time which can be channelled into individual attention to

pupils. And with dashboards and personalised learning pathways, teachers have excellent insights and tools to guide interventions.

4. Blended learning motivates and engages pupils in their learning. Our surveys have indicated that 95% of teachers typically report that blended learning methods help them to engage pupils with learning. Nowadays boys often lag behind girls in learning. Our analytics indicate that gamified solutions integrated into the approach such as bingel are especially motivating for boys, providing a way to bridge this gap.

5. Blended learning supports achievement and outcomes. It's a step towards personalized learning, taking pupils' personal achievement level and preferences into account. In our surveys, 85% of teachers have reported that such solutions help pupils to achieve their goals.

By applying blended learning, Finland can stay on top of its game. Teachers can make the most of their teaching and pupils stay motivated, which helps them to achieve their learning goals.

From first words, to forming phrases: the journey of learning to speaking English

Toby Mather, *CEO and Co-founder Lingumi*

Speaking English is the defining socio-economic skill in the lives of the 90% of children born into non-English speaking families each year. To date, studies of language acquisition have involved researchers holding microphones, in bilingual households; the data is limited, research into monolingual language acquisition near-impossible, and technology rarely leveraged to deliver meaningful insights. With Lingumi's English speaking platform, we're teaching children aged 2-6 around the world to speak English, from their first words, through to phrasal recognition, response, and thousands of syntactic variations. After measuring and analysing millions of data points on 20,000+ children, this submission (and accompanying presentation) will explore the acquisition of a second language, from words to phrases, through data. We'll see and hear (!) how children learn their first English word, how age and nationality affect accent, and how the beginnings of phrasal language form. Our methodology, and measurement system, are the world's first, and we're excited to demonstrate some of the extraordinary insights emerging from these category-defining techniques.

Beyond face value

Prof Norbert Pachler, *Pro-Vice-Provost: Digital Education, UCL - Institute of Education*

If learners are to benefit educationally from the potential offered by mobile technologies, we must understand the nature of the legitimate concerns that are reported. This presentation critically examines some arguments and evidence relating to the use of tablet devices and smartphones in education. Common concerns and issues include distraction from learning and potential negative impact on attainment, technology addiction, and online safety. There exists a need for all educators (parents, teachers, and the wider community) to play an active role in supporting learners to develop constructive and critical orientations towards mobile technologies, the media they bear, the functions they perform and the

(educational) possibilities they carry and to avoid reductionist 'black or white' views which have tended to characterize debates about new and emerging technologies in the media over the decades.

How kids learn

Agustín Porres, *Country Director Argentina, Fundación Varkey*

Kids learn from curiosity, they learn when they are interested in something. What captivates their attention might be nature, technology, games, sports or the passion they see in their teachers' eyes. At school kids learn when they feel safe, in a comfortable situation. Some of them could feel safe because they know the right answer, others will only feel safe if they can see there is room for mistakes. At school, in most of the cases kids shouldn´t know the answer. In the first place because they are supposed to learn something new not something they already know, but in the second place because in a world that´s changing there is no right or wrong answer. Instead there is teamwork, challenge and a lot of thinking and trying and thinking again. That is how kids learn: being engage by a bond to someone or to a topic, feeling safe to have a word and to take risks, being encouraged to share with their peers and to reflect on the process and the results.

So, if kids learn in such a way, adults, both family and teachers, should guarantee the conditions for that learning environment. It is our responsibility to create and share the strategies that are being effective. I know hundreds of teachers around the world who can testify the importance of these ingredients: an interesting topic or an inspiring person, a safe atmosphere and the opportunity to think, try, take risks and analyze the results. And we work to give those teachers the platform to show their experiences to the world.

Benefits of gamified learning for dyslexia

Jesper Ryynänen, *Co-founder, GraphoGame*

Dyslexia is not a fringe issue in education. In the UK alone it is estimated there are between 2 and 5 million dyslexics. Millions of people share grim childhood experiences of being told by their teachers and peers that they are "stupid", "slow" and "holding back the class". Despite dyslexia being defined as a literacy-based learning difficulty, a "persistent failure to acquire efficient reading skills despite conventional instruction, adequate intelligence, and sociocultural opportunity", the main symptom of the condition is often psychological. Due to a lack of effective support and understanding, many dyslexic children suffer from low motivation in school and low self-esteem. The effect of this on society is immeasurable. A longitudinal study involving 13,000 children in the USA found that 82% of 6th graders who failed an English course never graduated high school later in life; functional literacy is paramount in being a fulfilled and successful member of modern society.

This is where gamification design in special education can make a lasting, cost-effective, and scalable impact. Gamification is when engaging video game features are utilised to deliver non-entertainment content. The main objective of gamification is therefore to enhance motivation. While student motivation is an age-old challenge in education, it is an even greater challenge with children who struggle with *intrinsic motivation*, the behaviour arising from the personal satisfaction of engaging in an activity in itself. Since dyslexia often manifests itself as lowered motivation and self-esteem, gamification can support struggling readers by supplementing their learning with *extrinsic motivation*, a behaviour that arises when students feel satisfaction from outside factors, not personal satisfaction. In terms of gamification, this is when children are rewarded for completing challenging and arduous tasks with in-game achievements, medals, items and other satisfying game elements.

Not only can games improve children's motivation, games are a cost-effective and scalable way for teachers to automate dyslexia screening and remediation, whilst also providing data and analytics that support teachers in identifying those children who require 1-on-1 support.

How to address income and inequality to benefit kids' learning

Leo Schlesinger, *CEO Aliat Universidades*

We know that the education level of a country directly correlates with the income, inequality, life expectancy and quality of life of its citizens. We also know that in Mexico the richest 1/5 of the country has 8 more years of schooling than the poorest and that it also earns 20 times more.

In Mexico having a University degree is a privilege. Less than 30% of those who could study at University actually do. That is around 3.3 Million out of 11.4 Million that should be studying today. And that does not count an additional 8 Million that did not finish high school.

That reality condemns 16 Million people to a life without real economic opportunities and thus to exclusion. The correlation of these less fortunate and their participation in the informal economy and worse, in organized crime is also quite clear.

In the country today 75% of those studying attend free Public Universities. Many actually doing an excellent job. However, can only accept around 8% of applicants, are quite selective in the quality of their students and are by all means insufficient and quite limited in their ability to increase access. They are all economically constrained and many actually broke.

Thus, part of the solution lies with the private sector. If we really want to increase access to education both the public and the private sector have to address the issue.

Private universities that educate those left behind, accept students from all walks of life, most coming from disadvantaged backgrounds. These students face the flaws of basic poor public education systems, and endure shortcomings in reading comprehension and math, and all the issues associated with an upbringing at the base of the pyramid.

Students like these require special attention and teaching and at the same time cannot afford expensive tuition. Thus, for the private sector to be part of the solution they have to develop cost effective, quality and relevant solutions. That requires scale, innovation, technology and the best of execution capabilities. That is the challenge and what is required to change a system that is broken and that leaves behind many, if not most of its citizens.

Valuing the intimate connections between child, teacher, community and the natural world in how, and why, kids learn…

Dr Jess Schulschenk*, Executive Director Indaba Foundation, South Africa*

In light of the growing technological integration in both learning and living environments, how do we consider carefully the role of not just technology, but recast out attention to the role of the teacher, the community and, the increasingly distant from our lived experience, natural environment?

The myriad of challenges unfolding globally today present a great invitation, and in many a desire, to (re)connect with the living world we form an intimate part of. Dr Maria Montessori understood many years ago the innate ability of children to understand the universe in its wholeness, and care of the living as key to

all learning (Sutton, 2009). We need these lessons now, more than ever, as many approaches to sustainability can become technical and lost in mindsets of scarcity. How do we hold space for opportunity, restoration and even abundance in times such as we find ourselves in today? How do we take seriously yet lightly our role as guides to the next generation?

These are questions that guide our work at the Indaba Foundation as we embark on an ambitious mission to support community-based early childhood development (ECD) teachers through a holistic training programme to become guides for sustainable community development by nurturing our youngest, most vulnerable – with the highest demonstrated return on investment (Heckman, 2010).

The Indaba Foundation is committed to teacher training in Africa, and Jess is also the director for the Sustainability Institute, an international living and learning centre in Lynedoch Ecovillage, South Africa. In the Lynedoch Ecovillage, children of the onsite preschool are the heart and soul of the community, working in close collaboration with the Indaba Institute teacher training academy. Drawing on the learning community's two decades of experiences, Jess brings insights from their collective work in social justice and ecological restoration through transformative learning.

Bridging the gap
Sandra Sobanska, *Business Development and Growth Lead, Wunder*

Did you know that babies are born with the ability to learn any language due to high brain plasticity? Or that almost 90% of their brain infrastructure develops by age 5? It is said that the first 1000 days of a new-born's life is the most important period in their life where foundations of later cognitive abilities are established.

What parents do in this time matters the most.

Thanks to decades of research in psychology, neuroscience and education we know that there are three main indicators that predict a child's IQ, school readiness and socio-emotional development. It's the quality of their home learning environment, the quantity and quality of parent-child interactions and stimulating materials that the child interacts with.

Specifically, improving parent-child interactions has the highest potential for impact as they just require something that all parents, regardless of income, have - their voice. In a recent study, MIT and Harvard found that the number of back-and-forth conversations between the parent and the child directly activates the area of the brain responsible for language development (Broca's area). Together with the number of words a child is exposed to, those are the two key predictors of linguistic and cognitive skills.

Despite the vast research, there is still an achievement gap. It has been estimated that more than a quarter of four-and-five-year-olds (28%) in the UK lack the necessary communication and literacy skills when they enter the school system. Parents of all socio-economic classes struggle with establishing positive habits at home and knowing what their child's developmental needs are.

At Wunder, we believe that mobile technology and timely behavioural nudges can bridge the gap between science and parenting practice and give them validation and evidence-based activity ideas to nurture their child's skills through play. Founded by Stanford neuroscientist and a father, Wunder aims to be the most personalised parenting platform where caregivers receive the right information at the developmentally right time. To complement our current platform, Wunder are also user testing an innovative smart companion device that will allow parents to quantify the language exposure their child receives at home.

Improving ability to learn in poorly performing children through cognition tracking and development

Dr Keiron Sparrowhawk, *CEO and Founder, MyCognition*

The case of Woodside High School

MyCognition's cognitive health tracking and development programmes were adopted at the Woodside High School (London, UK) as an alternative therapy to help improve the academic performance (including numeracy and literacy) of a group of Year 8 pupils, seen at risk of failing their qualifications. Forty-three students were involved in the trial, all took MyCQ, half placed in the training group and half in a control group. In an after-school club, those in the control group were given extra homework support, while the training group played AquaSnap. The study lasted one term.

Results show improved cognition and academic achievement

The results showed the cognitive function and academic performance of the MyCognition training group improved more – almost twice that of the Control group, particularly in executive function and episodic memory, with significant improvements in children who trained more than 10 hours over the term. Across the 3 core subjects of Maths, English and Science, the training group consistently had better results that the control group and showed better increases in national sub-level 1, 2 and 3 (+2%, +13% and + 12% respectively). The percentage of test students showing regression almost halved. In total 13 subjects were teacher assessed and the training group had better results in 10 subjects. There was also a positive

correlation between the amount of cognitive training and improvement in academic performance, most pronounced in English.

Teacher and student feedback reports improved motivation

"MyCognition's programme can play an important role as a part of a school's holistic intervention package, particularly for those students who are struggling. In combination with other therapies, it can really benefit students in particular areas and that is what the results of this study show."

Summary - Clinical study at the Be Brave Ranch

Dr Keiron Sparrowhawk, *CEO and Founder MyCognition*

Fifty percent of mental illness emerges by 14yrs of age. In this study, in collaboration with University of Alberta, the MyCognition programmes were used by the "Be Brave Ranch", a specialist clinic in Canada, as part of a novel, intensive, residential program to help children aged 8-12 who have been victims of Children Sexual Abuse (CSA). Significant improvements were observed in cognition, linked to reductions in PTSD, depression and anxiety, with the potential for having a significant impact on the child's life outcomes.

Methods
Cognitive improvements were measured in working memory, executive function and attention, using MyCQ, the MyCognition assessment tool. PTSD reductions were measured using the Child Post-Traumatic Stress Disorder Symptom Scale (CPSS) scores, and depression and anxiety with the Revised Child Anxiety and Depression Scale-Short Version scale (RCADS-Short version).

Results
The results show improved cognition linked to decreased symptoms of PTSD, Anxiety and Depression. The benefits in cognition translate to an improved ability to self-regulate and manage emotions, to selectively use focus to avoid negative thoughts, to plan towards future objectives and pursue goals, to find solutions to challenging situations and make decisions in a confident way. These improvements will have a significant impact on the child's life outcomes in the short and longer term, including improved mental wellbeing, enhanced academic achievement, better social relationships and work success, and stronger mental resilience. This demonstrates that cognitive deficits occur together with mental illness, but that both are reversible with an appropriate intervention.

"With the right types of intervention, the right types of support, we can actually support resilience and shift of trajectory for children, adolescents, adults and obviously families"
Dr Wanda Polzin, Clinical Director of the Be Brave Ranch

What If We Taught Teachers the Same Way We Want Students to be Taught?

Katrina Stevens, *Director of Learning Sciences, Chan Zuckerberg Initiative*

How many schools began their year with teachers sitting in rooms listening to school leaders share information with them? How many teachers sat through hours, even days, of slide presentations? Too many.

As we continue to apply learning science principles to teaching students, we need to remember the adults in the system too. Everything we know about how kids learn applies to how teachers and other adults learn. We know that students need lots of practice and feedback to build mastery, for example. Teachers need the same. We know that spaced repetition helps students remember information over the long term. The same

is true for teachers. We know that establishing classroom norms allows students from different backgrounds to know what's expected of them. Similar norm setting helps teachers know how they are expected to interact with leaders and colleagues. We know students experience barriers to being motivated to learn. Teachers experience many of these same barriers to trying new things. Research shows us that unlearning is far more difficult than learning something new. This is perhaps even more true for adults who have held these beliefs for much longer. As we learn more about the negative impact of stress on students, we also need to recognize the impact of stress on teachers too.

As we support teachers, we should be asking these kinds of questions:

- How do we design our professional learning opportunities to model what we want to see in our classrooms?
- How can we provide opportunities for teachers to receive regular feedback on how they're applying the new principles they're learning (outside of evaluations)?
- How do we make sure that the information shared with teachers during training sessions is refreshed throughout the year when teachers need this information most?
- How can we uncover previous learning not grounded in evidence and help teachers "unlearn"?
- How are we supporting stress levels in our teachers?

Teachers deserve and need to have their own learning and professional development based on the sciences of learning, especially if we expect them to apply these same principles to their teaching.

Why We Need Learning Engineers

Katrina Stevens, *Director of Learning Sciences, Chan Zuckerberg Initiative*

Other fields have engineers - professionals who translate the research from a given field into practical use. We have chemical engineers who take modern chemistry and figure out how to apply principles of chemistry to the production and delivery of pharmaceuticals, for example. We have biomedical engineers who take what we're learning about medicine and apply it to healthcare. We even have food engineers who figure out how to get food from a farm to someone's table safely and economically.

But we have very few learning engineers - people who take the sciences of learning and human development and apply these principles to create learning experiences. We have some roles that are related, like instructional designers, but they're not often trained in the learning sciences. We have many researchers who study the full range of learning sciences - neuroscience, cognitive science, executive functions, social and emotional learning, for examples - but very few people who are trained to take this research and apply it to tools, classrooms and other learning environments.

An effective learning engineer focuses on the key learning outcomes and designs learning experiences at scale. In addition to pulling in the key learning science principles, a learning engineer also takes into account all of the practical elements of real-world learning. How easy is it for teachers and students to participate in the learning experience? Do they have the scaffolding necessary to be successful? Are there easy ways to gather evidence to see if the learning experience is showing similar results for all students? If not, is the system designed to learn and get better? How can these learning environments provide evidence to help teachers improve their practice?

If we had more learning engineers in the world, we'd have better learning environments that were based on the sciences of learning and development, and these learning environments would be designed to improve over time.

Two examples of translation from neuroscience to education

Prof Michael Thomas, *Director of the Centre for Educational Neuroscience,*
Birkbeck, University of London

Educational neuroscience is an interdisciplinary research field that seeks to translate research findings on neural mechanisms of learning to educational practice and policy, and to understand the effects of education on the brain. The interaction of the fields of neuroscience, psychology, and education relies on extensive dialogue, so that insights from neuroscience are shaped into realistic pedagogical practices, and educators play an active role in shaping the research direction of neuroscience researchers. Neuroscience and education can interact directly, by virtue of considering the brain as a biological organ that needs to be in the optimal condition to learn ('brain health'); or indirectly, as neuroscience shapes psychological theory and psychology influences education. I describe two current projects at the Centre for Educational Neuroscience that illustrate the engagement at different levels of policy influence.

The first project is a novel, computer-based learning activity for mathematics and science at primary age. The activity originates from neuroscience principles and now at the stage of large-scale randomised control trial. Evidence from cognitive neuroscience suggests that learning counterintuitive concepts in mathematics and science (e.g., that *the world is round*) requires inhibitory control to prevent interference from misleading perceptual cues and naive theories children have built from their experiences of the world (e.g., that *the world seems flat*). Training inhibitory control skills may improve children's learning. However, neural systems are content-specific, so training must be embedded in the content of the domain (mathematics problems, science problems) to yield a benefit. The goal here is a new pedagogical tool for teachers.

The second project addresses a concern identified by the World Bank that adult literacy programmes in the developing world are often ineffective – is there a neuroscience reason why the adult brain is less able to acquire literacy? In a report commissioned for the Bank, we reviewed age-related effects on learning. Nothing from neuroscience currently indicates severe and intrinsic limits for adults to learn education-relevant skills such as literacy, though some uncertainty surrounds upper levels of proficiency attainable and the amount of practice necessary to achieve them. However, from a neuroscience perspective, gains from optimising conditions at the level of the brain would still be confounded unless constraints are addressed at the levels of the person, learning environment and cultural context. Technology may provide benefits here (e.g., mobile phones) but is unlikely to deliver a revolution. The goal of this project is to inform policy decisions about building effective adult literacy programmes.

Educational neuroscience is consistent with an evidence-informed approach to policymaking. There are both benefits and risks with engagement between basic science and policy. The risks including simplifying the science ahead of what it can currently justify, and instances of science being used to support pre-existing policy agendas. I argue for the importance of not overselling the current state of scientific understanding, but not underselling the importance of the science of learning for advancing education.

Children's Playful Learning Technologies

Bo Stjerne Thomsen, *Global Head of Research – Lego Foundation*

Children learn through play when they are actively engaged in playful experiences, which deepens their understanding of knowledge, and grow the breadth of skills needed in the future.

The LEGO Foundation works in partnership with a wide range of international experts, to create the foundation for how children learn through play. We seek to understand the role of children's learning through playful technologies, with at least three important starting points.

1. **Technology is an integrated part of children's everyday play experiences.**
   Technologies are expanding children's play repertoire as an addition to (not a replacement for traditional play, and it's a regular and important part of children's lives today. Those who advocate for healthy child development must include this in their paradigm of the learning landscape.

2. **The characteristics of traditional play applies equally to play with digital technologies**
   The characteristics of playful experiences are apparent in digital play, which is no less valid or real than traditional forms of play, and experiences can be defined by the same characteristics of playful learning, whether children are engaging with wooden toys or digital apps.

3. **When children are playful with technologies, they also learn important skills.**
   Current evidence demonstrates that technologies like digital games, educational robotics, creative coding and digital storytelling have benefits across children's development and learning, but many do not yet know how to leverage technologies effectively.

When we acknowledge the benefits of playful learning technologies and are able to address the access, safety and content dilemmas, we can resist the often-misguided pressures to focus only on knowledge acquisition, reading, writing and math, and help children learn and experiment with the world through a variety of technologies.

This will include a focus on individual enabling factors like feedback in learning, autonomy-supportive practices and optimizing challenge levels; and to support system-level factors like equipping education with infrastructure, collaboration and pedagogies to integrate playful learning technologies.

This can leverage the use of playful technologies as a medium for an inter-generational and cross-system dialogue on the how to improve the quality of how children learn.