

# RAISING A GENERATION OF INVENTORS:

How Play Fosters  
Creativity and  
Innovative Thinking  
in Children

A Special Report by

the GENIUS of  
**PLAY**<sup>TM</sup>  
.....  
It's more than play!



The Lemelson Center  
for the Study of Invention & Innovation



## THE FUTURE OF THE MODERN WORLD DEPENDS ON INVENTION AND INNOVATION.

But how can we raise our children to become a generation of inventors and innovators? Research has proven that through play, young children learn important developmental skills, including the ability to tap into their imaginations—a key skill that helps develop out-of-the-box thinking.

**According to [The Genius of Play](#), whose mission is to raise awareness about the pivotal role of play in child development, play gives children a chance to truly let their imaginations run wild and create worlds of their own that they have control over. Whether it's a make-believe game or an arts & crafts activity, play provides children the freedom to come up with unique ideas without adhering to structure or rules.**

Importantly, an active imagination will continue to serve children throughout their lives. According to a survey of more than 1,500 chief executive officers from 33 industries around the world, CEOs believe that successfully navigating an increasingly complex world will require creativity more than any other skill.<sup>1</sup>

In order to cultivate successful innovative thinkers, it is imperative to give children the resources and experiences necessary to let them explore their creativity. Only when armed with these early life skills will children grow up to be successful adults who have the tools in place to discover new solutions to our most pressing world issues.

To address these challenges and provide guidance to parents and educators, The Genius of Play collaborated with the **Smithsonian's Lemelson Center for the Study of Invention and Innovation** to host a special panel, "Fostering innovation and Creativity through Play," at the National Museum of American History, to explore how play serves as a catalyst for creativity and innovation.

<sup>1</sup>(*Redefining Competition Insights from the Global C-suite Study – The CEO perspective* <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03719USEN&>)

**“Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the entire world.”**

**-Albert Einstein**

Source: Saturday Evening Post

[www.saturdayeveningpost.com/wp-content/uploads/satevepost/what\\_life\\_means\\_to\\_einstein.pdf](http://www.saturdayeveningpost.com/wp-content/uploads/satevepost/what_life_means_to_einstein.pdf)

## INTRODUCING THE PANELISTS:



**Vikas Gupta** is the co-founder and CEO of Wonder Workshop, and drives the company's vision, strategy, and growth to get coding toys into the hands of children. Wonder Workshop's robots – Dash, Dot, and Cue – are used

in more than 20,000 elementary schools around the world to help kids learn to code. Wonder Workshop's 2017 robotics competition brought together 30,000 participants from 63 countries — drawing equal participation from boys and girls. Before Wonder Workshop, Vikas headed Google's consumer payments division following its purchase of Jambool (the company he founded) in 2010. Previously he led the payments and web services groups at Amazon.



**Molly James** is a teacher at the Kent Place School, an all-girls private school in Summit, NJ. James works with some of the most creative and playful people on the planet—kindergartners! She is passionate about seeing—and helping

others to see—the profound impact play and creativity have on thinking, learning, and life. She works to empower her students with the skills, mindsets, and beliefs that enable them to problem-find and problem-solve. She's certain her students will one day create innovation that will change the world for the better!



**James McLurkin** is a senior hardware engineer at Google and a former professor at Rice University. He considers himself in the engineer construction business, first by encouraging and mentoring young

engineers, and now by building things that build more engineers. He is a lifelong member of the “bring your toys to work” club, and has managed to engage in very serious play with model trains, LEGO bricks, Nerf Blasters, mountain bikes, honeybees, and cardboard sculpture – all in a 100 percent professional context, of course.



**Jeri Robinson** is the vice president of early childhood initiatives at the Boston Children's Museum. She has more than 45 years of experience in teaching and consulting in the field of early childhood education. She is the developer of the

Museum's PlaySpace exhibition (one of the earliest prototypes for early learning family spaces in children's and other museums); founder of the Boston Cultural Collaborative for Early Learning, and co-founder of both Families First Parenting programs and “Count Down to Kindergarten.” Her love of community and passion for school readiness keep her busy as a member of several community boards and a member of the Boston School Committee (the governing body for the Boston Public Schools). And her love and passion for multi-ethnic dolls and afternoon tea keep her playfully busy planning doll activities and tea parties for the 50 junior members of the Black Gold doll club.



Panelist moderator **Monica M. Smith** is the head of exhibitions and interpretation at the Smithsonian's Lemelson Center for the Study of Invention and Innovation. She has served as the project director and curator on several major exhibitions at the National

Museum of American History, including the award-winning *Invention at Play* and *Places of Invention* exhibitions. She has published widely about the history of technology, invention, and play, including contributing to the *International Journal of Play* and *Museums at Play: Games, Interaction, and Learning*. She is also the former editor of the *Journal of Museum Education*.

## EXPERT PLAY

What is play? How does it define who we are during our formative years and then later on as adults? From LEGOs to dolls to cardboard, the panelists share their definition of play and the toys and activities they loved as children.

### Q: What is your definition of play?

**Jeri Robinson:** "Play is joy – doing things that you love to do. And I think play changes over the periods of your lifetime. I also would say for young children, play is the work in how they live their lives."

**James McLurkin:** "If it makes you happy ... It can't be anything but play."

**Molly James:** "Play is a way of interacting with the world that is both fun and powerful. What makes play powerful is it allows our brains to be open and to explore possibility, entertain new ideas, learn and take risks, and learn that failing isn't the end, but it's really the beginning to start a new game, stronger and smarter."

**Vikas Gupta:** "Play is anything that we see as open-ended and unconstrained in the hands of a child. And the tools can be anything: they could be toys; they could be robots; they could be books; they could be nothing; they could be out in the garden, but that's all play."

### Q: What did you like to play with as a child?

**Vikas Gupta:** "I grew up in India; it's a very different culture. I didn't grow up with a lot of toys. Every afternoon, I used to be out in the sun playing cricket. And I played board games, especially Scrabble."

**James McLurkin:** "I can't even imagine my childhood without LEGO. Cardboard was important too, remote controlled cars, my old trains, all these things that let you learn. Electronics and video games were great. You could actually write real games when I was young. They weren't these mega multi-billion-dollar efforts they are today. So those were all the toys I loved. I still do."



**Molly James:** “For me, being able to run around outside and be challenged by my brother, who’s three years older. And then the making of things with paper and cardboard boxes, and what you could create with them, definitely impacts me now as a teacher.”

**Jeri Robinson:** “I was an only child in a multi-generational household, and I think my play came from each of them. My mother was at home. I learned to sew, and I loved to play dolls, so I mimicked her all week long. She washed the clothes; I washed the dolls’ clothes, and all those kinds of things. My aunt was a puzzler, and so I’d go downstairs and do puzzles with her and play games, board games, and dominoes. My grandfather was retired from the railroad and was a cabinet maker, so I learned how to use tools. I got a chance to do a lot of different things.”

## America has a “Creativity Crisis”

In her study, “The Creativity Crisis (2011),” Dr. KH Kim reported that American creativity declined from the 1990s to 2008 as the country’s educational priorities shifted more to test-taking skills to emulate Asian success, rather than nurturing original thinking.

“The greatest declines in creativity among the youngest age groups suggest that the younger children are [more] harmed by American test-centric education,” Kim wrote. “Similarities between American high-stakes testing and Asian exam hell have appeared, especially in early childhood education. This indicates that increasingly fewer American innovators will emerge. The longer test-centric education continues ... the more we will see creativity and innovation decline.”

Source: *The Creativity Post* [http://www.creativitypost.com/education/the\\_2017\\_creativity\\_crisis\\_update\\_how\\_high\\_stakes\\_testing\\_has\\_stifled\\_innov](http://www.creativitypost.com/education/the_2017_creativity_crisis_update_how_high_stakes_testing_has_stifled_innov)

## IS CREATIVITY INNATE?

Are creative minds wired differently? Can people learn to be creative? The panelists agreed that while some children have more active imaginations than others, everyone possesses the ability to be creative. They just need to be inspired and have the ability to engage in activities that will allow them to tap into their creativity.

**Q: Some people say that creative minds are just wired differently. Do you agree with that? Or do you think people can be taught to be creative—particularly through play.**

**James McLurkin:** “My grad adviser at Berkeley said: Math is like any other muscle, you just need to exercise it. And the same goes for creativity. It’s just like anything else, you have to practice it. We have a user experience team at Google in my project and they’re just fantastic for getting all of us in the room and shaking us loose. And then once they’ve got us well-shook, we start exploring ideas. So, it can be learned.”

**Molly James:** “I think the wired part – it’s not that you’re born with it, but that the neuroplasticity of our brains is what wires it. You learn that there might be one way to do it, but maybe there’s another way to do it.”

**Vikas Gupta:** “The people around you have a huge influence on what you do. For example, if there is one very creative person, they can lift everyone else’s creativity up as well. I think in that collaborative social context, we’ve seen creativity lies much more in whoever you are with.”

**Jeri Robinson:** “For me, it’s experiences and opportunities. You can’t do what you haven’t had the opportunity to do. The more you do something the better you get at it. We have to give everybody more opportunity to really experience it.”

## THE VALUE OF PLAYFUL LEARNING

Play is crucial to children’s learning, creativity, and inventiveness at any age, but the earlier the better, according to the experts. Yet many times parents deter their children from engaging in play – and from ultimately reaping the benefits. For example, teacher Molly James noted that a game of dice is not just a game, but teaches children math skills, perseverance, negotiating skills, and strategic thinking.

### **Q: What is the magic age of a child to support and encourage learning through play?**

**James McLurkin:** “Twelve was the age where I was still unconstrained by any kind of rational notion of what I could and couldn’t do but had enough technical chops and enough skills to build really fun LEGOs or cardboard. I was programming about age 12.”

**Molly James:** “You really have to engage your four- or five-year-old now. I have parents who come to me in kindergarten talking about “what college is my child going to get into?” They don’t get that play is going to help them. Kids start to get discouraged quite early. They learn that the adults in their life do not want them to play, do not see the value of play. So, for me, it’s younger.”

**“Play can be fun, but play can also be serious. We talk often about playful learning, because there is learning in play.”**

– Jeri Robinson, vice president of early childhood initiatives, Boston Children’s Museum

**Vikas Gupta:** “I think you should start early—five or six. There is pressure in schools ... And it comes, often, from parents, not from anyone else, so emphasizing the value of play is critical. I think encouraging them to have that sense, that freedom, that they can actually go do this – I believe we should do that at a young age, which is starting at kindergarten.”

**Q: What do you say to the parent who is skeptical of the importance of play?**

**Vikas Gupta:** “Playing does not mean they’re not learning. If the child is actually not engaged, they’re less likely to learn. Play is a good way to engage them. We need to meet the kids where they’re at. I think one of the other things is to show what gets produced at the end of it – a great way to turn non-believers into believers.”

**Jeri Robinson:** “When you see your child’s face light up, or you see them really going back and doing something over and over again to get better at it—that’s play. So, play can be fun, but play can also be serious. We talk often about playful learning, because there is learning in play.”

**Molly James:** “For me, it’s to be able to invite parents into the classroom to experience opportunities where the kids are playing, but they’re really doing incredible work as well.”

**James McLurkin:** “As a professor, if I knew a parent was coming to class, I would try to have lectures that have off-the-wall content. For example, “Bring Your Mountain Bike to Work Day,” where students actually brought their mountain bikes to class and we looked at the fitness of the bunny hop, suspension, and the gear ratios in the mountain bike.”



## GIVING KIDS THE “TOOLS” THEY NEED TO BE SUCCESSFUL

Every school should incorporate playful learning into formal education to inspire childrens' innovative thinking. In addition, learning even basic skills, such as how to use scissors, enables children to execute their ideas.

### **Q: How do we get more play into formal education, and even into the upper grades?**

**Molly James:** “Teachers have to be reflective, first of all, to understand what the value of play is and how to communicate that. I think, to a certain extent, it falls on the educators to be reflective, but also to create that climate, even if it's in their own classroom.”

**Vikas Gupta:** “There's a town called Reggio Emilia in Italy. I visited that town for a workshop and learned about the philosophy and it's a wonderful town, wonderful set of schools, and that philosophy is all over the world now. In one school, in a math class, they gave an open-ended challenge to kids—how do you measure the surface area of a large blackboard? The students eventually used the A4 paper as the unit of measurement. They figured out the surface area of the blackboard by seeing how many papers it took to cover it, bringing out the principles of what measurement is, what surface area is, and so on. This shows there are avenues where you can integrate play and give kids the tools to figure answers out by themselves and learn a lot more.”

**Jeri Robinson:** “Shifting the curriculum. In the Boston Public School district, we have a very strong play-based curriculum. Boston is an urban district. We have lots of English-language learners, lots of children who struggle. We've invested a lot in the educators, but more importantly, in the curriculum. And the curriculum brings play in, in many appropriate ways.

For example, the kids have a construction unit that starts each year with a letter from the mayor with a question—what can you create that would make Boston a fairer place to live? This

### **PRINCIPLES OF THE REGGIO EMILIA APPROACH TO EDUCATION**

**Emergent Curriculum** in which curriculum topics are derived from discussions with students and their parents, as well as from things that are known to be interesting to children (puddles, dinosaurs, etc.).

**In-Depth Projects** in which students learn through thorough concept projects, often introduced to children as adventures, and can last anywhere from a week to the entire school year. During these projects, teachers become “advisors” to students, helping them decide the direction of their research, how they can represent what they learn, and what materials would be best suited for their project representation.

**Representational Development** of new ideas. The Reggio Emilia approach calls for the presentation of new ideas and concepts in multiple forms, such as print, art, drama, music, puppetry, etc.—ensuring that all children understand and connect with the concepts being explored.

**Collaboration** where student groups large and small are encouraged to work together to problem-solve using dialogue, comparisons, negotiations, and other important interpersonal skills. This fosters the notion that each child's voice is heard in order to promote a balance between a sense of belonging to the group and a sense of self.

*Source: Scholastic.com <https://www.scholastic.com/teachers/articles/teaching-content/reggio-emilia-approach/>*

project goes over three months, and it starts with conversations and kids come back with their ideas and they're making lists of all these ideas. Kids are coming up with words. They're writing. They're doing every single skill that you would want them to do, but with a purpose, and then they create models. If you go into those classrooms while these models are being made, they're very serious about it. They're not sitting there bored with worksheets."

**James McLurkin:** "As an engineer who's actively trying to get playful tech out ... if, when I was younger, I had better tools, better toys, better parts, then I could build better things and learn more and have more fun."

**Q: What are some of the resources in life that make great toys?**

**Jeri Robinson:** "School tools. We need to make sure kids have open opportunities to learn how to use everything from tape and glue and scissors and all of those things, so that when they get an idea, they have some sense about how to make it. The younger they can get these things, so that they're confident and comfortable with those skills, then they can do all of these other things that we want them to do later."

**Molly James:** "I would agree with tools—nuts, bolts, washers, screwdrivers ... learning how to rip duct tape—those are awesome playthings."

**Vikas Gupta:** "We live in a very digital world and we need to help kids make sense of the world that they live in. For example, I remember driving into our driveway, and I opened the garage door with the remote, and my kids were confused. Like, how does it work? And that was a teachable moment. We had a long exercise on how these things work and how they interact, and there's actually code running. Giving them a sense of how the world works—how does a YouTube video play on a phone that's sitting in your hand – let that be a place where they can go with their curiosity."



## Making Strides in Play

The Genius of Play ([www.TheGeniusofPlay.org](http://www.TheGeniusofPlay.org)) offers resources to serve as a guide for parents and communities to learn more about the benefits of play and child development. "Recess Mom" Barbara Larrimore used The Genius of Play assets to spread awareness within her community to change local recess law.

Dear Genius of Play,

Your dedication to save the childhoods of so many is a true inspiration. When I started the more Recess Campaign I did not have any idea where to begin. With the help of your fact-based infographics and research, I was able to bring awareness to my community. The community rallied in my town and across the state of Virginia to change the laws to double recess in Prince William County. More changes are coming, and more Recess Moms are being introduced to your insightful work.

Thank you for all you have done and continue to do.

Sincerely,  
Barbara Larrimore

## GETTING ON THE SAME LEVEL AS KIDS

As adults, play may not come naturally for many parents, but it's essential to how children learn fundamental skills that will help them later in life. Parents can immerse themselves in their children's play by getting on their level – by showing interest, supporting what their children are doing, and encouraging them that there is no wrong answer when it comes to playful experimentation.

### Q: How can parents help their children engage in playful learning?

**Jeri Robinson:** "You can't teach what you don't know. A lot of our parents are coming from other countries and have never done these things themselves. So really making time for them to become comfortable, get acquainted, and also helping them to say to their children, 'You know what, I don't know, but we can find out.'"

**Molly James:** "When you're trying to teach children how to read, and they resist, I truly believe it's because no one in their life who is an adult, who they respect, ever makes a mistake in front of them. Make mistakes in front of your children. Don't be afraid to fail."

**Vikas Gupta:** "Failure needs to be an accepted part of the process and I think we need to show that to parents and, definitely, have kids feel that there's no wrong answer."

**James McLurkin:** "As a professor, I got very comfortable not knowing where my students were going and letting them lead me through some new area that they were interested in. Being student-led was really good. So, getting parents to be kid-led would be great."

# CONCLUSION

The connection between play and invention is real but in order to see a correlation, children need to be allowed to flex their creativity through play. By bringing more play to the school curriculum, giving parents the confidence to play with their children, and helping our society understand and value the benefits of play, we can help children develop the qualities they need to become the next generation of inventors.

For More Resources Visit  
**[www.TheGeniusofPlay.org](http://www.TheGeniusofPlay.org)**  
**[invention.si.edu](http://invention.si.edu)**

