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LIFELONG KINDERGARTEN

Lifelong kindergarten

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We live in a world that is changing more rapidly than ever before. Today's children will face a continual stream of new issues and challenges in the future. Things that they learn today will be obsolete tomorrow. To thrive, they must learn to design innovative solutions to unexpected problems. Their success and satisfaction will be based on their ability to think and act creatively. Knowledge alone is not enough: they must learn how to use their knowledge creatively.

Unfortunately, most schools are out-of-step with the needs of today's rapidly-changing society. They were not designed to help students develop as creative thinkers. But there is an important exception: kindergarten. As I see it, the traditional kindergarten approach to learning is ideally suited to the needs of the 21st century.

What do I mean by the kindergarten approach to learning? Imagine a kindergarten classroom. In one corner of the room, a group of children is building a series of towers with wooden blocks. In another corner, a group is creating a large mural with finger paint. In the process, children are exploring important ideas: What makes a tower stand up or fall down? How do colors mix together?

Even more important, the kindergarten students are starting to develop as creative thinkers. As they playfully work together, they learn about the creative process: how to imagine new ideas, try them out, test the boundaries, experiment with alternatives, get feedback from others, and generate new ideas based on their experiences.

At the core of this *creative* process is the ability to *create*. If we want children to develop as creative thinkers, we need to provide them with more opportunities to create.

Friedrich Froebel understood this idea when he opened the world's first kindergarten in 1837. Froebel filled his kindergarten with physical objects (such as blocks, beads, and tiles) that children could use for designing, creating, and making. These objects became known as Froebel's Gifts. Froebel carefully designed his Gifts so that children, as they played and constructed with the Gifts, would learn about common patterns and forms in nature.

Froebel was making for makers - he made objects that enabled children in his kindergarten to do their own making and creating. Froebel's work can be viewed as an early example of Seymour Papert's *constructionist* approach to education. Papert argued that the activity of making things provides a rich context for learning. It doesn't really matter what you are making; you might be building a sand castle, writing a poem, cooking a new recipe, or programming an interactive robot. What's important is that you are making something that is meaningful to yourself or others around you.

Why is the activity of making so important to the process of learning? When you make something in the world, it becomes an external representation of ideas in your head. It enables you to play with your ideas and to gain a better understanding of the possibilities and limitations of your ideas. *Why didn't it work the way I expected? I wonder what would happen if I*



changed this piece of it? By giving an external form and shape to your ideas, you also provide opportunities for other people to play with your ideas and give suggestions on your ideas. *Why didn't I think of that? How can I make it more useful for more people?*

There is a constant interplay between making new things in the world and making new ideas in your head. As you make new things, and get feedback from others (and from yourself), you can revise, modify, and improve your ideas. And based on these new ideas, you are inspired to make new things. The process goes on and on, with making and learning reinforcing one another in a never-ending spiral.

This spiral is at the heart of the kindergarten approach to learning - and the creative process. As children create towers with blocks and pictures with finger paint, they get ideas for new towers and new pictures. And, over time, they develop intuitions about the creative process itself.

If this learning approach has been so successful in kindergarten, why hasn't it been applied in other parts of the educational system? One reason is a lack of appreciation for the importance of helping young people develop as creative thinkers. But there is another reason: the lack of appropriate media and technologies. Wooden blocks and finger paint are great for students working on kindergarten projects and learning kindergarten concepts (like number, shape, size, and color). But as students get older, they want and need to work on more

advanced projects and learn more advanced concepts. Wooden blocks and finger paint won't suffice. So, after kindergarten, most schools shift to an "information delivery" approach to education, using lectures, books, and other resources to deliver information to students.

How can we help students, as they move through elementary school and beyond, continue to learn in a kindergarten approach, so that they continue to develop as creative thinkers? This is where, in my opinion, digital technologies can play a transformational role in learning and education. Of course, digital technologies do not, on their own, support a kindergarten approach to learning. Indeed, most schools use digital technologies simply to extend and reinforce the information-delivery approach, using computers to deliver information just as they use lectures and books. But if digital technologies are properly designed and supported, they can extend the kindergarten approach, so that learners of all ages can continue to learn in the kindergarten style.

The LEGO Mindstorms robotics kits are a good example. As students create and program robots with Mindstorms, they are working in a kindergarten style: playfully making things in collaboration with one another. But they are learning ideas and concepts (such as sensing, feedback, and control) that are far beyond the kindergarten curriculum. I see Mindstorms as a Froebel Gift for the 21st century. Just as Froebel's blocks, beads, and tiles engaged kindergarten children in creative explorations, Mindstorms uses new materials (computer

programs and electronic circuits) to engage older children in creative explorations.

I hope that, over time, more and more technologies are developed to extend the creative approach of kindergarten to learners of all ages. But it won't be easy. There are strong cultural forces that are pushing in different directions. Many kindergartens are starting to change their approach. Kindergarten students are spending more time filling out phonics worksheets and memorizing math flashcards, rather than playing with blocks and finger paint. In short, kindergarten is becoming more like the rest of school.

If we want to help children develop as creative thinkers, so that they are prepared for tomorrow's society, we need to do exactly the opposite. Instead of making kindergarten more like the rest of school, we need to make the rest of school - indeed, the rest of life - more like kindergarten.

