

# EDUCATION FOR THE 21<sup>st</sup> CENTURY ECONOMY

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## KEY POINTS

- A new “knowledge economy” has arisen in which the primary source of wealth creation lies in the innovative application of intellectual capabilities.<sup>1,7</sup>
- In this economic environment, there are two things every parent must keep in mind when thinking about their children’s education: 1) to be successful in a knowledge economy marked by an accelerating rate of both technological and social innovation, your children will probably have to “reinvent” themselves more than once in their lifetime, and 2) we have to face the fact that people skilled at innovation will reap disproportionate rewards.
- Thus, schools should be promoting creative thinking in students. Unfortunately, education is still dominated by the concept of learning as a kind of factory production.<sup>13</sup>
- In contrast, Maria Montessori realized over 100 years ago that fostering creativity is a key educational goal.

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*“If education is always to be conceived along the same antiquated lines of a mere transmission of knowledge, there is little to be hoped from it in the bettering of man’s future.”*

Maria Montessori  
*The Absorbent Mind*

What do you want from your children’s school? Most parents and schools are focused on knowledge and discipline, which everyone knows go hand in hand. Hence the intense stress on standardized examinations.

But stop and think about it. Are knowledge and discipline really enough? And what do we mean by “discipline”? Do we mean discipline that comes from within? Or merely the habit of complying with the demands of authority?

There was a time when knowledge and disciplined compliance with the rules of factory work and rigidly hierarchical corporate organizations were the twin keys to success. But mainstream economists are telling us that this is no longer the case. Our industrial era economy and society are increasingly being transformed by digital technologies, and so have the requirements for success. Let’s consider what that means for what your children need from their schools.

In a recent article in [Foreign Affairs](#), three prominent economists wrote:

Machines are substituting for more types of human labor than ever. As they replicate themselves, they are also creating more capital. This means that the real winners of the future will not be the providers of cheap labor or the owners of ordinary capital, both of whom will be increasingly squeezed by automation. *Fortune will instead favor a third group: those who can innovate and create new products, services, and business models* (emphasis added).<sup>1</sup>

Technological innovation “explains all modern growth.”<sup>2</sup> Without a flow of new technologies growth inevitably slows and then stops because of diminishing returns on capital investment no matter how capable and hardworking the population.<sup>3</sup> Hence, the “best definition of the Industrial Revolution is the set of events that placed technology in the position of the main engine of economic change.”<sup>4</sup> The principal innovation of the Industrial Revolution was not any specific technology but rather the “invention of invention” – a systematic, science-based approach to innovation.<sup>5</sup>

Constant innovation entails the ongoing “creative destruction” of existing economic structures described by Joseph Schumpeter.<sup>6</sup> Over the last four decades, advanced industrial economies have shifted away from an emphasis on production of physical goods,<sup>7</sup> which is increasingly relegated to developing nations with lower labor costs. A new “knowledge economy” has arisen in which the primary source of wealth creation lies in the innovative application of intellectual capabilities “to integrate improvements in every stage of the production process, from the R&D lab to the factory floor to the interface with customers.”<sup>7</sup> The OECD defines the concept of the knowledge based economy as “an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors.”<sup>8</sup>

With the shift to a knowledge economy, the percentage of GDP attributable to “intangible” capital has increased significantly.<sup>7</sup> A recent study by the World Bank concluded that at least 80 percent of the wealth in high-income countries consists of intangible assets, and middle-income countries are fast catching up.<sup>9</sup> A car, for example, is “less and less the product of metal fabrication and more a smart machine that uses computer technology to integrate safety, emissions, entertainment,

and performance.”<sup>7</sup> The intellectual property and know-how that goes into cars and other tangible assets is an increasing percentage of their value. The products of Microsoft, Google and the other leading companies of the knowledge economy are even less material.

Of the 20 public companies with the highest employee value in terms of market capitalization, seven are high-tech innovators founded since the early 1970s: Apple Inc. (no. 3); Gilead Sciences Inc. (no. 4); Qualcomm Inc. (no. 10); Google Inc. (no. 14); Amgen Inc. (no. 16); Microsoft Corp. (no. 17); and eBay Inc. (no. 20).<sup>10</sup> Most of the products produced by these companies are exportable, often at very little marginal cost. The cost of producing software and pharmaceuticals, for example, is concentrated in their development: the cost of producing another copy of a software product or a pill is essentially trivial. It has been estimated that twenty to thirty percent of value created by innovation that produces exportable products is passed onto the employees in the form of salaries.<sup>11</sup> Google Inc. (47, 756 employees) and Apple Inc. (80,300 employees), for example, are among the 15 highest paying companies in the world, with median salaries at \$125,000 and \$123,000 respectively.<sup>12</sup> In addition, many employees earn capital gains through stock options.

In this economic environment, there are two things every parent must keep in mind when thinking about their children’s education. First, to be successful in a knowledge economy marked by an accelerating rate of both technological and social innovation, your children will probably have to “reinvent” themselves more than once in their lifetime. What do I mean by that? Well, consider the fact that commercialization of the digital technologies that are now at the center of economic development are largely dependent on the internet, which for all practical purposes did not exist until around 1990. Think of all the technologists, venture capitalists, and entrepreneurs who built companies like Microsoft, Apple, and Google and who simultaneously transformed established industries like banking, finance, and manufacturing. These people were not taught how to do that – they had to be creative. They had to create new professions like IT management, web design, etc. In short, they didn’t just change jobs – they created new ones as old jobs became less and less productive, and in many cases were eliminated altogether. This process of creative destruction is only going to accelerate, making personal reinvention *the* critical skill in the coming decades.

Second, we have to face the fact that people skilled at innovation will reap disproportionate rewards. “In the future, ideas will be the real scarce inputs – scarcer than both labor and capital.”<sup>1</sup> And of course the scarce input will naturally command the highest prices. Hard work in acquiring stores of existing knowledge and diligence in applying that knowledge are no longer guarantees of economic success. People who generate valuable ideas will be in a position to take most of the rewards of innovation in a knowledge economy.

Schools should be promoting creative thinking in students. Unfortunately, education is still dominated by the concept of learning as a kind of factory production. In a widely cited study, Raymond Callahan showed how educators in the first third of the 20<sup>th</sup> century applied the principals of “scientific” business management to educational practices. The core idea was (and unfortunately remains) that “The school is a factory. The child is the raw material. The finished product is the child who graduates.”<sup>13</sup> And though teachers are considered the factory workers required to shape the raw material according to management’s standards, it’s ultimately the students who are forced to comply with those rigid and detailed standards.

In contrast, Maria Montessori realized over 100 years ago that fostering creativity is a key educational goal. And there is direct evidence that Montessori schools foster creative performance, development, and potential compared to conventional schools (see *Montessori and Creativity*, this volume). Montessori environments allow children to construct substantive knowledge, which is the building block of creativity in all subjects, from math to the fine arts. Discipline is emphasized, but not compliance with directives from above. Instead, Montessori schools foster inner discipline that enables students to do the hard, organized work that creativity in all fields requires. Finally, Montessori schools carefully foster and nurture each students innate drive to create by providing them control of their learning, ownership of their work, flexible use of their time, allowance to work at their own pace, and opportunities to work and learn beyond the classroom walls.<sup>14</sup>

It's time to dismantle the factory framework that dominates our educational system today yet does not serve children's needs for the 21<sup>st</sup> Century. But we don't have to reinvent the educational wheel because Dr. Montessori already did.

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