

---

# Issues in Technology, Learning, and Instructional Design

---

Classic and Contemporary Dialogues

Edited by  
Alison A. Carr-Chellman  
and Gordon Rowland

## Paradigm Change

### Its Time Is Now

Charles M. Reigeluth

---

#### Introduction

Think of our schools<sup>1</sup> as a horse and buggy. It worked well in a different time, but the times have changed. Educational needs have changed as much as transportation needs. Reforms to a horse and buggy will never give us an airplane. Yet we seem to expect that reforms to our schools will meet our new educational needs. And why should we not?

We have never experienced a paradigm change in education. All we know is piecemeal reforms. But there *has* been a paradigm change. In the mid-1800s, as our communities transformed from agrarian to industrial societies, the one-room schoolhouse no longer met our educational needs and was gradually replaced by the current factory model of schools. This was a *paradigm change* because the fundamental structure of the one-room schoolhouse was different—it had no grade levels, no courses, and no standardized norm-referenced tests.

Could it be that once again our educational needs have changed so dramatically that only paradigm change will work? To answer this question, we should first determine whether our current educational systems are no longer meeting our needs. Consider the following:

- More than half of America's high school seniors are not proficient in reading, and 75 percent cannot do math, according to the recently released National Assessment of Educational Progress.
- The PISA test administered by the Organisation for Economic Co-operation and Development in 2012 found that the United States ranked seventeenth in reading, twenty-seventh in math, and twentieth in science among the thirty-four OECD countries
- The hidden curriculum—compliance and tolerance for boring, repetitive tasks—was very important for manual labor during the Industrial Age but is counterproductive for the initiative and problem-solving skills needed for knowledge work in the Information Age.
- Our communities are increasingly segregated by socioeconomic status, resulting in greater disadvantages for many students.

Clearly, our schools are not performing as well as we would like and need them to perform in an increasingly competitive global economy.

This poor performance is not due to lack of effort. Since "A Nation at Risk" was published in 1987, billions of dollars have been spent on educational reforms. So why have educational reforms failed, and are they destined to continue to fail, no matter how much money we spend on them?

## Position Statement

The primary reasons for this poor performance have to do with fundamental changes in society—its educational needs and tools. To understand this, it is helpful to consider a fundamental truth about learning—that students learn at different rates. Yet our current paradigm of education tries to teach a fixed amount of content in a fixed amount of time. So the current structure, by basing student progress on time rather than learning . . .

- forces slower students on before they have mastered the material (so they accumulate gaps in knowledge that make future learning of related material more difficult and virtually condemn those students to flunking out), and
- holds faster learners back, demotivating them and squandering their sorely needed talents.

As described in the recent book *Reinventing Schools: It's Time to Break the Mold*, a system designed to *not* leave children behind would have each student move on *only* when s/he has learned the current material, and *as soon as* s/he has learned the current material. Until schools make this fundamental structural change, they will continue to leave children behind, no matter what educational reforms we make—more high-stakes testing, more teacher professional development, smaller class sizes, more focus on basic skills, longer school day or year, or whatever the latest fad.

So what does this have to do with changes in society? Alvin Toffler has convincingly described how societies undergo massive waves of change, from the Hunting-and-Gathering Age, to the Agrarian Age, the Industrial Age, and the Information Age. Each wave has brought about paradigm change in all of society's systems:

- the family (extended family in the Agrarian Age, followed by the nuclear family, and now the working-parent family—dual-income and single-parent);
- transportation (horse and sailboat in the Agrarian Age, followed by a combination of the railroad and steamboat, and now the automobile and airplane);
- lighting systems (flame, incandescent bulb, and LED);
- healthcare systems;
- legal systems;
- communication systems; and
- of course, education systems.

The one-room schoolhouse was the predominant paradigm of education in the Agrarian Age, the current “factory model of schools” in the Industrial Age, and the learner-centered paradigm (which only exists in about 1 percent of schools in the United States so far) in the Information Age.

The reason for these paradigm changes is that each wave of change creates different ends and means – different purposes for education and different tools for education. Regarding purposes, during the Industrial Age, manual labor was the predominant form of work. We did not need to educate many people to high levels; rather, we needed to separate the future laborers from the future managers and professionals by flunking them out. We needed a system that could sort the students—that would leave the slower students behind. So we invented time-based student progress, norm-referenced testing, and letter (or number) grades.

But in the Information Age, knowledge work is becoming predominant, so we need a system that is focused on maximizing every student's learning, which is evidenced by our talk about no child left behind. This requires a system in which student progress is based on learning, not time. Furthermore, the hidden curriculum in the Industrial Age paradigm was compliance and tolerance for boring tasks, which were important preparation for the assembly line, but they are counterproductive for knowledge work. Now we need a hidden curriculum of initiative, problem solving, collaboration, and lifelong learning, which can perhaps best be achieved through self-directed, project-based learning.

Regarding different tools for education, information technologies make it much easier and less expensive to customize student progress and other aspects of instruction, enhance intrinsic motivation, integrate criterion-referenced testing with teaching (as is done in the Khan Academy), and keep track of what each individual student has learned.

There are many schools in which paradigm change has already been happening—over 140 are listed in *Reinventing Schools*. But in contrast to piecemeal reforms, paradigm change entails fundamental changes throughout the entire system:

- the instructional subsystem (from teacher-centered to learner-centered and self-directed, from standardized to customized, from extrinsic to intrinsic motivation),
- the assessment subsystem (from norm-referenced to criterion-referenced, from separate from instruction to integrated with instruction, from artificial to performance-based),
- the record-keeping subsystem (from comparative grades to an inventory of attainments),
- the roles of teachers (from “sage on the stage” to “guide on the side”),
- the roles of students (from passive, teacher-directed to active, self-directed),
- the roles of parents (from cookie bakers to partners in their children's learning),
- the roles of technology (from tool for the teacher to tool for the learner), and
- much more.

Where piecemeal educational reforms are destined to fail, paradigm change will inevitably eventually succeed. This is a point that policy-makers fatally overlook, with devastating consequences for our children and consequently our communities and economy.

The recognition that students learn at different rates also requires rethinking the definition of “achievement gap.” It is traditionally defined as the gap in achievement between groups of students of the same age—typically by racial or socioeconomic groups. This definition arose out of Industrial Age thinking (expecting all students to be the same) and results in a misplaced emphasis for improving education.

The achievement gap that we should be most concerned about is the gap between what an individual student has learned and what that student could have learned. The goal should be for all children to reach their potential, not for all to have learned the same things by the same age. The only way for all to learn the same things by the same age would be to hold back the faster learners.

The United States espouses the goal of leaving no child behind, but it is clear that our Industrial Age system with time-based student progress is *designed* to leave children behind, and no educational reforms within that paradigm can change that dismal fact. Toffler's insights show us why paradigm change is needed at this point in history—indeed, why it is *inevitable*, just as the transformation from the one-room schoolhouse to the factory model was inevitable. The major concern is how long this paradigm change will take, and how much damage will be done to our children, their communities, and our economy before it happens.

Toffler's insights also help us to see what the new paradigm should be like and how it will greatly improve student learning, equity, and cost-effectiveness while simultaneously

professionalizing the teaching occupation. The book *Reinventing Schools* elaborates on that vision, describes three school systems that fit the new paradigm (along with evidence of their effectiveness), and offers guidance for what school systems and policymakers can do to engage in this transformation.

Until educators, policymakers, and the public understand that the **paradigm must change** from one in which student progress is based on time to one in which it is based on learning, we will continue to leave children behind, regardless of what piecemeal reforms we make.

### **Note**

1. Everything in this article applies equally to training systems.

**RESPONSE BY ROGER C. SCHANK**

Any article that mentions that “the United States ranked seventeenth in reading, twenty-seventh in math, and twentieth in science among the thirty-four OECD countries” on the PISA test makes me very upset. How can tests like those possibly matter in any way? Why are the results of a multiple-choice test a measure of how our schools are doing?

Our schools are terrible places. Reigeluth is correct about every single thing he says about what is wrong with them. He gives a good history of how they got that way and rightly complains about so-called educational reform. But he leaves out the only thing that really matters. As I have been saying for years, “There are only two things wrong with school: what we teach and how we teach.” He ignores one and barely just touches on the other.

Who cares how the United States is ranked in reading? Is there a reading contest I do not know about? I care how we are ranked in the ability to make rational decisions as a nation. Spending billions on invading Iraq or fighting Ebola without any debate whatsoever and without a whole lot of rational discussion speaks volumes about how well we are educated. It is too bad we cannot read Dick and Jane stories and answer questions about what the main theme is. Our problem is not that we cannot recall the quadratic formula; it is that we teach the quadratic formula at all and somehow imagine that learning it will help us to reason better. We, as a people, have trouble having coherent conversations. In fact, conversation, which is, in my view, the only way we really learn without actually doing something, is disappearing. When everyone texts all the time (in the middle of lecture is a very good time) and people communicate by emojis, we have a problem. Can the schools help? They could, in principle, if we made school something that excited kids and gave them things they really wanted to talk about. But instead we bore them to death by teaching them the name of phyla or balance chemical equations that will help them do well on a PISA test or an SAT or will satisfy the ancient requirements set down by Harvard about what subjects they must master, independent of whether they will ever have any use for the stuff they had to memorize.

“Clearly, our schools are not performing as well as we would like.” Really? Is that the issue? Schools are not supposed to perform at all. They are supposed to provide daycare and bore kids to death and make them do a lot of test prep. They are performing very well at that. Who cares if kids “learn at different rates”? What is important is that kids are actually different one from the other. One is fascinated by animals and another by road construction. Can we just let them follow their own interests? I understand why that would be difficult in the era of the one-room school house that Reigeluth discusses. But it is quite possible in the age of the Internet where software can be built to simulate any environment and teachers can become mentors in any area of learning augmented by people who are experts who might be located anywhere.

You want to try building airplanes? Why can we not build an aerospace engineering course relying on industry experts to help design and mentor it? We have to stop thinking that what we teach has to stay the same forever. We have been teaching useless subjects ever since Charles Eliot had his meeting in 1892. Actually, Petronius complained about the useless curriculum in the schools in ancient Rome. Let us stop talking about an “achievement gap” and start allowing kids to determine for themselves what they would like to achieve. They will do that anyway.

A “good teacher”—and I have that in quotes because I do not really believe in teaching—is a good guide. A good mentor is someone who listens to what a student cares about and then makes that student think harder and expands his or her horizons. You do not like algebra? Then do not study it. You will not remember it anyhow. As Peggy Sue says in *Peggy Sue Got Married*: “I happen to know that in the future I will not have the slightest use for algebra, and I speak from experience.” I was a math major. I never used algebra after my schooling was finished either.

## REJOINDER BY CHARLES M. REIGELUTH

Roger Schank seems to have missed my major point, that piecemeal change cannot meet our current educational needs in the Information Age—that only paradigm change can meet our new educational needs. I agree completely with his comments about tests. My intent there was to show that, even by arcane measures valued by many policymakers, our schools are not doing well, and I indicated several other measures that reflect truly important criteria.

I also strongly agree with Schank's comment about the need to change both what we teach and how we teach. I have written extensively about the need to change *how* we teach (Reigeluth, 1987; 1999; 2006; 2011; 2012; 2014; Reigeluth & Garfinkle, 1994; Reigeluth & Karnopp, 2013) and more recently about the need to change *what* we teach (Reigeluth, 1999, 2012; Reigeluth & Karnopp, 2013; Reigeluth, Myers & Lee, in press), especially regarding social and emotional development and other aspects of the full, well-rounded development of each student; but I did not address either to any significant extent in this piece, because my focus here is on the *need* for paradigm change. Nevertheless, I do address *how* to teach extensively in my other piece in this book, and in more recent work I strongly support Marc Prensky's thinking about a new paradigm of curriculum that is no longer organized around the four major pillars of math, English, science, and social studies (MESS) but instead organized around the four pillars of thinking effectively, acting effectively, relating effectively, and accomplishing effectively (Prensky, 2014, in press).

Furthermore, regarding what to teach, I have expressed support for Schank's admonition that we should let students "follow their own interests" and cultivate their individual talents (though I also think some basics should be required of all students in public education). And I agree with Schank's concern about our ability to make rational decisions as a nation. The fact that our schools are failing miserably at this today reinforces my main point that paradigm change is sorely needed in our educational systems. Similarly, Schank's contention "What is important is that kids are actually different one from the other" is part of my main point. It is the need to address those differences that requires paradigm change at this point in human history.

I found it disappointing that Schank led off with a criticism of my citing PISA test scores as one of several indicators of the failings of our current paradigm of education, but I was heartened by his affirmation: "Our schools are terrible places. Reigeluth is correct about every single thing he says about what is wrong with them. He gives a good history of how they got that way and rightly complains about so-called educational reform." If there is one thing I hope the reader takes away from this piece, it is that piecemeal reforms are futile—that only paradigm change can solve our educational woes.

## References

- Prensky, M. (2014). The world needs a new curriculum. *Educational Technology*, 54(4), 3–15.
- Prensky, M. (in press). A new paradigm of curriculum. In C. Reigeluth, R. Myers, & B. Beatty (Eds.), *Instructional-design theories and models: The learner-centered paradigm of education* (Vol. IV) (pp. 121–140). New York: Routledge.
- Reigeluth, C. M. (1987). The search for meaningful reform: A third-wave educational system. *Journal of Instructional Development*, 10(4), 3–14.
- Reigeluth, C. M. (Ed.) (1999). *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. II). Mahwah, NJ: Lawrence Erlbaum Associates.
- Reigeluth, C. M. (2006). A vision of an information-age educational system. *TechTrends*, 50(2), 53–54.

- Reigeluth, C. M. (2011). An instructional theory for the post-industrial age. *Educational Technology*, 51(5), 25–29.
- Reigeluth, C. M. (2012). Instructional theory and technology for the new paradigm of education. *RED, Revista de Educación a Distancia*, 32. Retrieved from RED, Revista de Educación a Distancia website.
- Reigeluth, C. M. (2014). The learner-centered paradigm of education: Roles for technology. *Educational Technology*, 54(3), 18–21.
- Reigeluth, C. M., & Garfinkle, R. J. (1994). Envisioning a new system of education. In C. M. Reigeluth & R. J. Garfinkle (Eds.), *Systemic change in education* (pp. 59–70). Englewood Cliffs, NJ: Educational Technology Publications.
- Reigeluth, C. M., & Karnopp, J. R. (2013). *Reinventing schools: It's time to break the mold*. Lanham, MD: Rowman & Littlefield.
- Reigeluth, C. M., Myers, R. D., & Beatty, B. J. (2017). *Instructional-design theories and models: The learner-centered paradigm of education* (Vol. IV). New York: Routledge.
- Reigeluth, C. M., Myers, R. D., & Lee, D. (in press). The learner-centered paradigm of education. In C. Reigeluth, R. Myers, & B. Beatty (Eds.), *Instructional-design theories and models: The learner-centered paradigm of education* (Vol. IV). New York: Routledge.