



THE TECHNOLOGY FACTOR

Nine Keys to Student Achievement and Cost-Effectiveness

*“Project RED is
nothing less than a
blueprint for remaking
American education.”*

~ Angus King
Former Governor of Maine



Project RED | The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness

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and Cost-Effectiveness

The Greaves Group
The Hayes Connection
One-to-One Institute



“Our students are different, and they need different learning opportunities. This report provides insight into how educational technology can power those new learning opportunities.”

~ Anita Givens
Associate Commissioner
Standards and Programs
Texas Education Agency

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“Project RED is nothing less than a blueprint for remaking American education—second-order change—not through more or better testing, charter schools, longer school days, more or even better teachers, but through fundamentally altering how we do education, the first real change in the process of education itself in a thousand years.”

~ Angus King
Former Governor of Maine

Foreword

Every morning on the plains of Africa, a gazelle awakens, knowing that it must outrun the fastest lion, or be killed. At the same time, a lion awakens, knowing it must run faster than the slowest gazelle, or it will starve.

So it doesn't much matter whether you're a lion or a gazelle; when the sun comes up, start running.

~ African Proverb

Suddenly, and without much warning, the United States finds itself in the predicament of the lion and the gazelle. Instead of the easy grazing of the past sixty years or so, now running is not optional but imperative. Economic competition is global, focused, and unrelenting; there is no such thing as a “safe” job. Whatever it was that formed the basis of your state’s economy 50, 25, or even 10 years ago is now at risk; and whatever it is that is coming next is hard to see or define, let alone prepare for.

This came home to me in the late nineties when the bloom of the dotcom bubble was beginning to fade, and the call-center jobs we all thought were the next phase of industrialism were disappearing almost as fast as they had come. It suddenly hit me that I had no idea what the citizens of my state were going to do for a living 20 (or even 10) years from now. And the events of the past ten years have only intensified this sense—and my conclusion that the recession we have been in for the past few years is more structural than cyclical.

The fact is that everybody in the world wants our jobs and the standard of living that comes with them, and for the first time ever, they have the means to take them.

So what do we do? Denial is always an option (probably the most common one at this moment), but that is surely not going to help us adapt to the new reality all around us. As my father used to say, no decision is a decision, and it is usually the wrong one.

Another option is to meet what is fundamentally an economic challenge with economic remedies—tax cuts and incentives; a new round of protectionism; lower interest rates; “streamlining” regulation; scouring public budgets for “fraud, waste, and abuse”; credit enhancements; investment in research and development—in other words, the usual suspects. These may be helpful on the margins, but none individually—or even the whole list—will fundamentally alter the trajectory of 21st century history, which is inevitably in the direction of intensifying global competition.

As I learned when I read this report, steps like these, while important and maybe even occasionally useful, represent “first-order change”—incremental improvement but not the kind of transformative action necessary to meet major, disruptive challenges. Sandbags and shelters are sufficient for most storms, but as we learned, when a Katrina hits, we need a whole new level of response.

And make no mistake, we are in the midst of an economic Katrina—huge, inexorable, and deadly—and it threatens to sweep away with it a great deal of what we have come to believe is our birthright.

But I believe there is something, actually one thing, we can and must do to give ourselves a fighting chance—dramatically improve both the output and efficiency of our schools. We cannot compete on wages or access to natural resources or capital, and besides, those are the currency of the age just past. The new competition is in innovation and invention, creativity, productivity, and vision. And the wellspring of all of these is learning—history and language, science and math, drama, music, and dance. We are seeing the fruition of the promise—and the threat—of industrialism. A person’s economic future depends on brains, not brawn, and the best brains, or maybe more accurately, the best trained brains, will win.

But it is not about cramming more physics or Spanish into 16-year-old heads; it is about giving them the tools and techniques to teach themselves, both in school and beyond. In this connection, my friend Seymour Papert made the most profound observation I have run across on 21st century education: “It is no longer good enough for schools to send out students who know how to do what they were taught. The modern world needs citizens who can do what they were not taught. We call this ‘learning learning.’”

In order to achieve this, we need change that is big and transformational, not gradual and incremental. It means twice the educational output, however measured, at something less than today's cost. It also means educational equity on an unprecedented scale; given the stakes, we simply cannot afford the massive waste of talent represented by failing schools and lost communities. And it means education that is at once more rigorous and more engaging, more collaborative and more inclusive.

Which brings me to this report.

Project RED is nothing less than a blueprint for remaking American education—second-order change—not through more or better testing, charter schools, longer school days, more or even better teachers, but through fundamentally altering how we do education, the first real change in the process of education itself in a thousand years.

The authors did not create this blueprint out of whole cloth and present it to us here as the latest in what seems to be a semi-annual iteration of “school reform”; instead, it is the product of old-fashioned research—a hard analytical look at what is working in schools and school districts around the country. And what is working is ubiquitous technology (a fancy way of saying that every kid has a laptop) fully integrated into the classroom by well-prepared and well-led teachers. The closer the student-computer ratio gets to 1:1, the better the results; the better prepared the teachers are to take full advantage of the potential of the technology, the better the results; and the stronger the leadership of the process by the principal, the better the results.

In a sense, I have been waiting for this report for ten years. It, along with the pioneering work of people like David Silvernail here in Maine, confirms what a small group (and I am not kidding when I say small) thought back in 2000—that a digital device in the hands of every student made total sense and was the tool upon which a truly transformed educational system could be built.

But the report also underlines our major learning here in Maine—that the computer is the necessary starting place, but alone is not sufficient to generate the transformational change we so desperately need. What we have learned is that it is all about the teachers and the leadership in the school; with great professional development and a new pedagogy, amazing things happen, but just handing out the laptops is not going to do it.

In this sense, Project RED confirms one of my most deeply held convictions about successful leadership—that execution is as important as vision. The vision of a digital device in the hands of every student, providing access to all the world, is a powerful idea, but it fails utterly if the network is down or the screen freezes or the teacher is unschooled in the techniques of technology integration. Through painstaking work, the authors here tease out the factors that can and do make it work—from school leadership to professional development to simple reliability and on down the list.

And so we are back to the lion and the gazelle. There is no doubt that when the sun rises, we had better run. The key question, however, is in what direction? Fortunately, this report gives us a pretty good map.



Angus King
Governor of Maine, 1995-2003
Sponsor of Maine Learning Technology Initiative
Brunswick, Maine
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Project RED was inspired by the desire to contribute to the re-engineering of education, through research and through sharing compelling stories of transformation.

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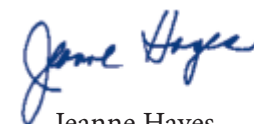
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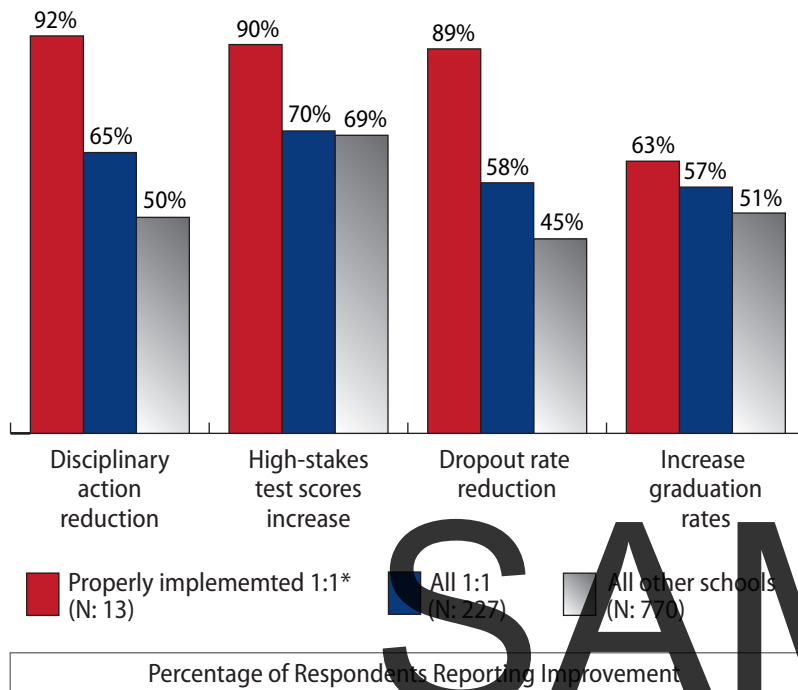
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Chart 3.3. 1:1 Works when properly implemented



SAMPLE

*Properly Implemented 1:1: Those schools practicing the top four key implementation factors (intervention classes every period, principal leads change management, online collaboration daily, core curriculum weekly).

Interestingly, the data show that 2:1 schools resemble 3:1 or higher-ratio schools more closely than 1:1 schools, demonstrating that 1:1 schools may be fundamentally different in a pedagogical sense, analogous to the fundamental difference between pay phones and cell phones.

The bleak long-term economic outlook may have an impact on the adoption of educational technology, which is considered an expensive proposition in schools. And, certainly, 1:1 computing is more expensive than 3:1 in terms of the initial outlay expenditure.

But other factors are at work that will have a positive impact on 1:1 adoption. Device costs and total cost of ownership are both declining. It can be argued that connectivity, application availability, community of practice, and the knowledge base in schools for successful implementations are all improving.

And, as discussed in Chapter 9, there are a number of positive financial implications attached to 1:1 computing, particularly when “properly implemented.” These factors all point to the possibility that the rate of 1:1 adoption will accelerate in the future, especially as perceived costs come down (price elasticity) and as more schools become comfortable with technology, either directly or by observing peers and colleagues.

Finding 4: The principal’s ability to lead change is critical.

Change must be modeled and championed at the top.

The impact of a good principal has been widely documented.⁵ Good principals also contribute to distributive leadership, in which team members surrounding the principal play an important role.⁶

As shown in earlier studies, strong district leadership is also essential for successful schools.⁷ All levels of leadership are important, individually and collectively, including school boards, superintendents, and assistant superintendents for curriculum, instruction, technology, finance, and operations.

The Project RED analysis shows that within the school the principal is one of the most important variables across the 11 education success measures, suggesting that change leadership training for principals involved in large-scale technology implementations is of paramount importance.

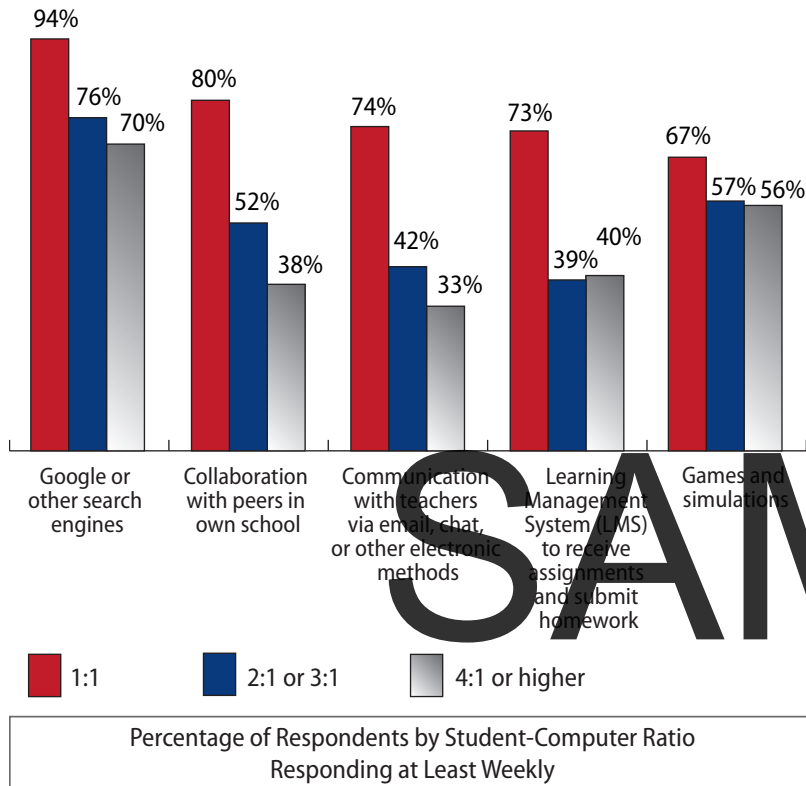
⁵ Hattie, John, 2009.

⁶ Fullan, M., 2001; Spillane, James P., 2006.

⁷ Greaves, T. & Hayes, J., 2006.

Chart 4.4. How frequently do students actually use technology in the following activities? (Q18)

Technology Tools Used: Actual Use Estimated – Top Five



- Respondents in environments where the student-computer ratio is higher than 1:1 have larger percentage gaps between the expected and actual student use of technology tools.
- *Significance of 1:1 technology:* For over 50 years, education research has pointed to the influence of educators’ expectations on student performance. Today, those expectations make the difference between whether or not students use technology tools integrated into learning, affecting their level of preparation for the global economy.

The chart shows the top five usage categories, and Table 4.4 shows the remaining seven categories.

Table 4.4. Student use as observed by principal by student-computer ratio

| Category | 1:1 (%) | 2:1 or 3:1 (%) | 4:1 or Higher (%) |
|---|---------|----------------|-------------------|
| Spreadsheets, graphs, tables, and charts | 66 | 43 | 32 |
| Social media (e.g., blogs, tweets, wikis) | 60 | 33 | 22 |
| Online formative assessments | 50 | 26 | 18 |
| Student response systems (including clickers) | 40 | 31 | 20 |
| Online summative assessments | 36 | 19 | 16 |
| Collaboration with peers in any school | 30 | 19 | 13 |
| Virtual field trips | 20 | 12 | 12 |

Read As

- The highest rate of consistency between the expected and actual rates of student behavior in 1:1 environments is around the use of online search engines. 97% of respondents expect weekly use, and 94% of respondents report actual weekly use.
- The second highest correlation in 1:1 environments is between the expected and actual use of peer collaboration tools. 89% of respondents expect weekly use, and 80% of respondents report actual weekly use.