Will Going Digital Improve or Transform Education?

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Well I've been busy the past couple of months trying to write a book. I think I might start by announcing its title so far as *Fiddling While Rome Burns*. I think that's what exactly what the world's doing about education. We're all meddling with little details, tinkering here and there with a system which is about to collapse. I'd like to talk about that. I'd like to talk about why I think it's about to collapse, what we could do about it, what are the obstacles.

I start my book by a parable, which I am going to read, which is about a professor of education in the year 2050, who gives his students an assignment to explain an historical paradox. At the beginning of our century – which means now – when the world was in the first phases of the biggest revolution in learning since the invention of printing, the governments of the most powerful countries of the world embarked on policies to prevent schools from adopting new forms of learning. How do you explain this paradox?

It is quite remarkable that just at this point when new vistas of what could be learned – there is new knowledge and ways of learning it – at this point the world just suddenly decides to embark on legislating standards and curricula, especially in the United States where there wasn't anything like it before, entirely based on nineteenth century images of knowledge. Most paradoxically, the National Science Foundation, one of our leading organizations – its standards for science education do not mention computer science or information sciences.

I picked out some remarks earlier today that indicate that Europe might not be in a better state for that, because strangely we talk about, "Oh the computer is just a tool." We don't have to understand how to use it, you can drive a car and use a portable phone without having to knowing its mechanics. This is because the education world is absolutely out of touch with the intellectual trends of the century. What makes our century's science thinking different from any other century are the ideas associated with computation, computers and information science, and the idea that we should give children this powerful thing they care about more than anything else, that they ought not to know what goes on inside it – it blows the mind. Well a number of things blow the mind – perhaps most of all, the fact that school, the institution entrusted with learning, is the laggard in our society, in the course of a genuine revolution in learning that is taking place.

More people are learning more things in more different ways than ever before – everywhere except in school. It's astonishing – no other word would do – that everywhere where there is knowledge work, you expect to see a computer on every desk and yet our schools still boast of the fact that we've finally achieved a computer in every classroom. Wow, it is astonishing. So what I'd like to talk about are some examples of change and resistance to change. To illustrate, to get a little bit of a handle on this astonishing phenomenon.

My first example of change is – we are in Ireland, I'm going to read from this book, called *How the Irish Saved Civilization* by Thomas Kyle, and it's about how St. Patrick brought Christianity to Ireland. It goes like this: "Patrick's gift to the Irish was his Christianity.   The first de-Romanized Christianity in human history, a Christianity completely inculturated itself in the Irish scene. Although Rome had officially adopted Christianity since the fourth century, the Christianity had been received into Rome, as he puts it here, not Rome into Christianity. Roman culture was little altered by the exchange. It is arguable that Christianity lost much of its distinctiveness, but in the patrician exchange Ireland had been received into Christianity, which had transformed Ireland into something else, something never seen before. A Christian culture, where slavery and human sacrifice became unthinkable and warfare where – he does say something about how the Irish are too fond of physical combat to do away with it altogether – but was greatly reduced.

Now I think that's a model, I think it's a very good model worth studying. I think that what we've seen happen in our schools is exactly like – much closer to Kyle's picture of what happened to Rome, which took in Christianity but didn't change anything, as against here where something deeply changed. And I think that in relation to the new learning culture, this is what is happening in our schools now and this is what we have to see differently.

Why should it be different in Rome, I mean, why was it different in Rome than in Ireland? Why might we expect the Irish to do the same miracle again, in relation to this new revolution? Well I'd like to say, and I do think deep down in my heart, it's because the Irish have this wild imagination, because they are passionate, because they are close to nature, because they believe in

magic and that is what we need. I think these are all elements that we need to bring into the otherwise cold, Romanized and Latinized version of use of computers called "ICT." I hate that, I really hate that name. Well, I think there are some other reasons also. One of them is because Ireland is a small place. And maybe in small places, less dominated by big bureacracies you can make changes happen more easily and I don't think it's without analogy. It's in Maine, where I live at the moment and where we've been able to take the lead in the United States in bringing about the material basis for bringing a real culture of digital means and digital learning into our schools – that Maine would be the first state to adopt the idea of a computer for every child, although it's the 40th state in income, is I think very significant. I think from Ireland and maybe what we heard from Estonia – often the smaller place that thinks of itself as a developing country is the one where development can happen. Whereas the countries that think, "We are developed," are too arrogant to open the door to real change.

The next example I'd like to give after St. Patrick and Ireland is one where change didn't really happen until it was too late, and this is the Soviet Union. I think there's a strong analogy, I think that of all institutions in our countries, the one that is closest to the Soviet Command Economy is our education system. And I think the key thing in the Soviet Command Economy and one of the key things that really contributed to its collapse – not the only one – but I think that if this one hadn't been there it could have solved all of the other problems. It had a system that did not allow change, that discouraged any individual initiative. And I think this is the biggest danger in our education system. It's not only in the system, it's in the way of thinking.

This morning I made an intervention – for which I'd like to apologize to our French delegate for picking on that – but I did pick on it rather mischievously because I think that the way the situation in France was presented is a symptom of exactly what's wrong with our thinking. It was presented in a global view of France: the average number of computers, the connectivity in all the schools. That's not the dynamic of how change happens, in any area. Look at how medical advances get adopted, or business advances. Somebody is the frontrunner. What's important is not the overall thing, what's important is Marseilles, is Bouche de Rhône, is

Lyons, is the place where people are going out in the forefront. Because that is what will draw the others along. This is what we need to shift our attention to.

I want to tell one more little parable to illustrate an important point. What are the problems? What are the obstacles to facilitating this change? The parable I'd like to tell is a little bit rude but, well, maybe it's provocative. It's about a country in which, for reasons lost in history, people had adopted a diet based mainly on suet. Now this isn't good for the health, it's not very enjoyable either but somehow they managed to get along on this very poor diet. They got along because they had a brilliant tradition of medical researchers and medical practitioners who found out how to cure the diseases and the difficulties that come from this poor nutrition and little additives to add to the suet to make it work a little bit better. So one day people decided, somebody noticed, we can import all sorts of food stuff, why should we stick with this diet? So they proposed developing an alternative diet; didn't get anywhere. Partly because people said if suet is good enough for grandpa, it's good enough for my kids. But the real reason was a much deeper one – one that we need to pay careful attention to. This is what I'd like to leave as my real message here. The real reason was ignorance. Now the medical researchers in this country were not ignorant in the sense that they didn't know anything, they were super smart and super well informed about suet and it's diet. They didn't know anything about making a different kind of diet. And so no other diet got made.

And I believe that this is our situation today. We are very expert in dealing with the diet of intellectual suet which we deliver to our children in the schools, which maybe made sense in the nineteenth century, doesn't make anymore sense today. Yet we keep on doing it! Why? Because grandpa had it, so we should have it. But most importantly because the education world is a closed-in world. And inside this world the knowledge of trying to make a different diet isn't there. It's not a matter of poor will or not wanting to. So just one example, just imagine since we were talking about Rome...

My other Roman story is which is half true, remember in Rome they used to use these funny numerals like X's and V's and I's and all that. So I'd like to imagine, suppose we lived in a

country where it was just like ours except the people used Roman numerals. Then somebody comes along and invents this new system of numbers – which we use. In fact the Arabic numerals were not invented by educators for an educational purpose. They were invented by mathematicians actually. But they could have been invented for an educational purpose because with Arabic numerals you can learn much more easily to do much more powerful things than you could do with the Roman numerals. However, there would have been great resistance. Not only out of conservatism but people would have said, "Oh but they'll never pass the tests, because our test are based on how to deal with IV is different from VI," and all the rest of that. Or people would say, let's call in our experts on curriculum. But this change isn't a change in curriculum, it's a different mathematics, it needs mathematical creativity to produce it. Nobody who's an educator by profession knows the kind of basic concepts that you would need to invent a new kind of mathematics.

But this is what we need to do. We need to reinvent new kinds of mathematics that would be like Roman numerals. They won't fit our curriculum, they won't prepare people for our tests, they will be rejected by everybody in the establishment – but children who learn them will be able to do the important things much more effectively, with much better learning. We've got to learn to open the doors of educational innovation, to let in the kind of people who could do that kind of invention, and we've got to make it possible for them to do it. Talking about Rome, when I was at school they made us learn Latin and they said that we should learn Latin because it encouraged what today would be called higher-order skills. In the United States you can get a laugh by saying, "Not long ago any child who didn't know Latin would be a child left behind." But I guess that's not funny in Europe. I think that we laugh at this justification for Latin but I think we laugh too soon. I think it's not going to be long before people look at our justifications for things that we put in our curriculum being just as quaint as the learning Latin is the way to develop the mind.

To emphasize that point, I'd like to introduce a little terminology. I'd like to use the word Latinesque. Latinesque justifications are justifications for learning this because it serves

some other purpose.   As opposed to, I'm going to call them Driveresque. Driveresque justifications are what you use if you are designing a test for the driver's license: there's certain things that you absolutely have to know, not because they serve another purpose but for themselves. The question I'd like to leave you with is how much of our curriculum – let's focus on mathematics – I think that 95% of our mathematics curriculum is justified only for Latinesque reasons. Does none of "solve quadratic equations using that formula" or "draw parameters" or "add fractions doing the least common denominator" – we just don't do it.   So if you want to justify this thing on pragmatic, Driveresque grounds, it just doesn't cut the ice. It can't work. Now I don't mean that it's bad, I'm all for Latinesque justifications, I'm all for teaching things because they develop deeper ideas and deeper ways of thinking and self-confidence and a sense of intellectual power. However, as soon as you recognize that it is Latinesque, you've got to say "why that one."

"Why that one." I calculate that our mathematics curriculum is one millionth of the total mathematical knowledge that we could be teaching children. We taught that particular millionth because it seemed to be suitable in the nineteenth century, because it was teachable using pencil and paper. We should now be asking what alternatives are there, what other kind of mathematics are there that could lead to the same kinds of results that our Latinesque justifications, if we admitted that they are that, would lead to.

Just this weekend, I saw a beautiful example here in Ireland. I see sitting in front of me a Deirdre Butler, who's been running a project called, "Empowering Minds," in which children use computerized, mechanized LEGO to do engineering at the youngest ages. They first learn engineering, then from there they progress to learning the ideas behind it, and then they learn the mathematics. This would be inventing, it's a little probe toward inventing a different kind of content. It's not a different way of teaching; it's not pedagogy. It's different knowledge. It's a good example of turning knowledge – turning learning – upside-down. Instead of starting with this abstract stuff we had from the nineteenth century, let's start with stuff that's really engaging for the children, out of which the deeper ideas can develop.