

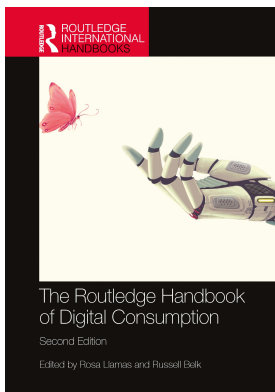
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### Education in a digital age

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# EDUCATION IN A DIGITAL AGE

## Do we need more innovation in educational innovations?

*Pedro De Bruyckere*

The list of sequels in the cinemas can no longer be kept up to date, and cover versions of cover versions are now commonplace in the music world. And while people keep talking about educational innovation and renewal – in 2020 fueled by the rapid introduction of on-line tools because of COVID19 – the question I want to ask is whether those many changes are suitable and/or especially new.

Yes, we have been using Zoom/Teams/... a lot now, and many institutions are looking at keeping a lot of the digital tools when all of this is over. But will these changes last when the pandemic is finished is less clear as the urgency can disappear. Rather than looking at the use of digital technology because of a virus leading to the closure of most of the schools and institutes, I want to discuss the element of digital in education in this, and the coming age not based on the current situation that may be even can prove to be a Pyrrhic-victory for EdTech. This danger is not unimaginable as a lot of technology had sometimes to be introduced at a high pace without enough time to develop adequate material and enough training to use the technology wisely.

To discuss the future of education in a digital age, I first need to address the two aforementioned questions. I'll first examine the last question: if many of the present innovations are actually that new when you look at the underlying pedagogical approach, hoping that this will make it easier to answer the first question: if the often proposed changes are suitable to keep.

### **Ancient innovations and equally old battlegrounds**

In recent years you probably have heard or read many experiments and arguments for what is called 'Flipped Classroom', partly inspired by initiatives such as the Kahn academy. But how new is the idea of watching instruction at home and then asking questions in class or practicing? How dissimilar is this from the teacher who – already a very long time ago – for the first time gave the assignment to read a chapter in advance so that the students could participate in class discussions. Just like then, every student carries out that assignment at home very dutifully. Well, they should.

Have you ever heard of la Methode Mutuelle? The approach also has other names, such as Lancaster education. This form of mutual (primary) education consisted of:

... Students taught each other under the guidance of more advanced students, the monitors, while the teacher took over the coordination of their tasks, opening the possibility of teaching hundreds of students with one teacher, a solution considered simple and inexpensive to organize mass education.

*(Simons, Vreugde, & Depaepe, 2015, p. 30)*

Let us put 100 students or more in one virtual or non-virtual space, provide peer tutoring and trained monitors, and a few teachers who ensure that everything runs smoothly. It does sound contemporary, doesn't it?

The oldest examples of this pedagogy, however, date back to... the end of the 18th century. Such schools were already in place in France (Poucet, 2009). In the same 19th century, we had in Belgium and certainly in Brussels, a battle between mutual education as described and simultaneous education labeled as the Dutch school approach, what today would be labeled as traditional classroom education. There were also mixed forms in which, for example, weaker students received mutual education and stronger students were more often taught in class (Simons, Vreugde, & Depaepe, 2015). This battle of more than 170 years ago seems to persist today. Still, many advocates for one side or the other seem to have forgotten its historical roots, let alone the various intermediate positions in the discussions. Even worse we seldom learn from the past outcomes.

A third example is the current attention to personalized learning, propagated by, e.g., Bill Gates and Mark Zuckerberg (Herold, 2017), often associated with artificial intelligence that would make it possible to have a personal tutor as a learner.

Personalized learning could be described as

instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners. In an environment that is fully personalized, the learning objectives and content, as well as the method and pace, may all vary (so personalization encompasses differentiation and individualization).

*(U.S. Department of Education, 2010, p. 12)*

While in this definition, the word 'technology' is missing, do note that this definition is taken from the National Education *Technology* Plan. The idea is that computers will make this kind of personalized learning possible. In the 2021 book 'Teaching Machines, Audrey Watters (2021) makes clear that this idea isn't new. At the beginning of the previous century, educational psychologists such as Pressey (1927, Benjamin, 1988) and in the late fifties of the previous century such as Skinner (1958) already developed teaching machines that made it possible to tailor education to, e.g., the learning tempo of children. Watters explains that the reasoning then was similar to the arguments being made now. Pressey also discovered already in the 1920s that the results of learning through technology could be limited and warned Skinner that the pedagogy surrounding the technology could be crucial for success. This discussion seems to reappear again and again. As Watters states, it is wrong to think that things have changed in this discussion because now we have electronically and digitally connected devices. It rather seems to be a continuum with the same arguments being used over and over again: schools are outdated, technology will free up time for teachers, more will be learned, and education will be able to become more student-centered.

## Learning versus teaching

Educational philosophers such as Biesta (2015), Meijer (2013), or Simons and Masschelein (2008) have already identified the shifting focus within education on a path moving from a focus on teaching to a focus on learning. This focus on learning and the person of the learner also has very ancient roots and goes back to the ideas of Jean-Jacques Rousseau. It has gained even more momentum since the beginning of the last century through various Modern educational thinkers such as Montessori, Freinet, or Peter – Jenaplan – Petersen (De Bruyckere, Struyff, & Kavadias, 2015).

But even in that early period, there already was a struggle between the more student-centered and society-renewing, pedagogical vision of, for example, Dewey and the more educational psychological, scientific approach in which ‘to measure is to know was central to, for instance, Thorndike, but in which children also had to fit into an existing society at an earlier stage. A battle that, according to Ellen Condliffe Lagemann, was won by Thorndike (Lagemann, 1989), but in which you may wonder whether it shouldn’t be better described as a tie at that moment: the importance of measurement and control as well as student- or pupil-centered work both continued to be advocated. Sometimes this is a contradiction in hopeful discussions, but in practice, for example, in the aforementioned historical and in the contemporary pleas for the integration of technology in such as personalized education, you can see both being applied in the same breath without suspecting the profound philosophical contradiction.

We often seem to be effectively blinded by the element of technology. But under the skin of, e.g., the (failed) Dutch iPad schools, or similar projects such as the American AltSchool or the Swedish Kunskapsskolan, there is mainly a Rousseau- or Dewey-inspired way of thinking in which it is hoped that technology should make this learning more easily. All the aforementioned educational projects relied on or still rely heavily on technology. The basic idea is often that the technology should facilitate the learner’s own choice and at the same time make it more authentic or lifelike. At the same time, the technology also allows for the necessary control and adjustment via learning analytics, which is more in keeping with a more measuring and knowing approach, even more, visible in the use of proctoring software during online evaluations.

The whole wave of personalization that we now are experiencing in education can be regarded in that way as old wine in new digital bottles, where you can wonder whether the wine has a good grape mix.

The current countermovement inspired by cognitive psychology with advocacy for more classroom teaching and direct instruction (DI) is both older and slightly newer than the examples of innovations I just discussed. Classroom education is even older than the Modern school systems that reacted to simultaneous education. DI, however, is instead a child of the 1960s when viewed strictly as the approach developed by Siegfried Engelmann and his colleagues and is too often erroneously reduced to old-fashioned, classroom-based teaching. This couldn’t be further away from the truth. Nevertheless, DI also has old roots in behaviorism and cognitive psychology going back to 1885, among others, with insights from Ebbinghaus.

## Real new innovations?

But are there no new innovations at all? The wave of Massive Open Online Courses (MOOCs) over a decade ago seemed to be new, but the innovation may be different than

many people suspect. In the first decade of the present century, these Massive Online Open Courses were all the rage and would have been impossible without technology. The basis was a whole new theory of knowledge, namely Connectivism. Stephen Downes and George Siemens developed this theory for a new, digital age at the beginning of the current millennium (Downes, 2008; Siemens, 2004). In Connectivism, the inventors assume that all knowledge in the world is present as a chaotic whole and that it develops further and faster. As a learner, we must discover patterns in this tangle of information coupons and knowledge and make connections between the ‘knots’ that contain this information. Today— in a digital age – it is possible to make connections via technology. In this way, we no longer have to experience everything personally, but we can also use the experiences of others to learn. This theory made it possible to develop courses with hundreds or even thousands of students at the same time, whereby a few ‘start nodes’, the professor or lecturers spread information in the network, but all students involved in the course can also be buttons that distribute information within the network.

You might think this is – again – just some form of mutual or reciprocal education. But this is not the real innovation that MOOCs have been. There is also an essential difference. After all, in Connectivism, it is no longer just about owning knowledge yourself but about knowing where to find the knowledge. You no longer have to be able to repair your car yourself. It is enough if you have a smart technician in your network. That is why I have so far consistently called this theory a theory of knowledge rather than a learning theory, because in my opinion, like social constructivism, it takes a position more about what we should learn and knowledge than about ‘how’ we learn or how we transform information into knowledge.

### **But didn’t the world change a lot...**

An overused argument for change is often that we tend to think that we live in special times. This can be both especially good or bad. This kind of thinking is called chronocentrism. And yes, the COVID-pandemic seems to be something extraordinary, but we tend to forget previous plagues such as the swine flu ten years earlier because we weren’t the victim.

You can recognize chronocentrism in claims about rapid changes in society or huge technological advances. Another interesting field where you can recognize such ideas is when discussing young people, a large part of our ‘customers’ in education.

We have been using many different names for the past generations, such as X, Y, and Millennials. Discussing why this is often a mistake would take us too far, but I do want to discuss one pet name for young people that was coined by Mark Prenzki already in (2001): the so-called Digital Natives, often used as a reason to change education by integrating a lot of technology. They were dubbed digital natives to distinct them from their parents and grandparents, who were described as digital immigrants. These children would be hugely different because they are born into a digital world. Therefore, they should get different forms of education as they have different needs and possibilities. Sadly, this distinction, purely based on personal observations by Prenzky, isn’t confirmed by research. In the work I did with Paul Kirschner, we checked over a decade of research following this claim, and we found that there is no such thing as digital natives (Kirschner, & De Bruyckere, 2017). We also checked other popular claims – such as 65% of the jobs our children will do, doesn’t exist yet – do discover they are often incorrect, with this claim dating back to the 60s of the previous century (De Bruyckere, Kirschner, & Huslhof, 2019).

But also, several of the reasons people use against using technology in education don't hold up. While claims that technology can hurt the brain and learning of children can also gain a lot of attention (e.g., Carr, 2010; Spitzer, 2012), these are also often based on a very specific reading of the actual science (De Bruyckere, Kirschner, & Hulshof, 2015). And while studies such as by Carter, Greenberg, and Walker (2016) show that the presence of technology can hurt learning by just being present, this was the case when using technology in a traditional lecture approach. Escueta, Quan, Nickow, and Oreopoulos (2017) conclude in their review that access to technology may or may not improve academic achievement at the K-12 level, with also a possible positive impact on the academic achievement of college students. The effect of technology on learning depends on what is being taught, who is being taught, how it is being taught, ....

### Two certainties

Looking back on centuries of educational innovation, one can notice two certainties:

- Certainty 1: The almost unchanging 'grammar of education'. This grammar of education that remains essentially the same is to be the basic tenet of a person knowing more about a particular topic going with learners to initiate them in that topic.
- Certainty 2: At the same time, we will continue to fight this grammar of education. Adjusting this essence under the motto of the coach instead of teacher, self-managing teams, problem-based education, etc. is becoming increasingly difficult (Elmore, 1996).

As described, the motives for fighting that grammar of education can be manifold, from purely ideological motives going back to philosophical foundations to purely financial reasoning to replace expensive teachers with technology, although this option can sometimes be even more expensive. Or simply because the others are doing it too. The latter is also possible because lemmings behavior is not really strange to education.

These two constants form the basis for the sigh in the subtitle of this chapter, as I often miss the innovation in what is presented as an educational innovation. Too often, we lack really fresh, new ideas, and no: an app is not just going to change this.

### A new focus: improving instead of innovating

But how can we really innovate? Perhaps by focusing on another starting point, namely, how can we improve education? Can we consider innovation as innovation if it does not imply improvement? Tim Surma gave me this example: driving blindfolded is an innovation, but whether it is an improvement? And so we come to the original first question from the introduction to this piece. Are the changes good?

I do know that improvement is usually implicitly the intention of every change, but if you really put improvement at the center, then you automatically start asking different questions than with pure innovation in the steps you take.

You could ask the following questions freely from Dylan Wiliam (2018):

- Does the new approach solve a problem we are experiencing?
- How much more will be learned?
- How much will it be?
- Can we implement it here?

This allows you to gauge the desirability of a change. If something costs more, but the learning effect may not increase: don't do it. If you have to choose between different approaches, realizing that you can only spend every dollar once, you may be able to make healthier choices.

William's approach does have an important limitation. The desirability of a change within a pedagogical vision is lacking. Therefore, I would add two questions, namely:

- How does this approach fit within our vision?
- What are the ethical consequences?

Let me first discuss the question about vision. Having a shared vision as an institution is important, also for learning (see, among others, Kurland, Peretz, & Hertz-Lazarowitz, 2010), but this is only possible if the vision is concrete and supported by a team. It is best to avoid empty claims such as transparency or putting the learner central. Full-blown transparency is simply a lie because every school will have things that the team rather keep hidden. And when stating that the learner is central, Simons and Masschelein (2017) rightly ask which one, the student now or the learner later? But more importantly, it is best not to cut a vision in stone. If you find that your vision:

- Causes problems, or
- Less is learned, or
- Costs more for the school or the student, or
- Is it not implemented in practice?

Well, then I would change my view instead of thinking that maybe that view is still not being properly applied.

Let me apply this concretely to the most recent 'real' innovation that I described earlier in this contribution when discussing Connectivism. In concrete terms, in the case of MOOCs, there was a great democratization dream, but at the same time, one that went against the grammar of education and allowed various 'knots' between the teacher and the students. The courses often offered free of charge would lower the threshold to higher education, even in places where there was little or no higher education available. Ten years later, we know that this democratization dream turned out to be just that: a dream (Reich & Ruipérez-Valiente, 2019) or worse: that poorly executed online tools can just widen the gap between rich and poor in higher education (Bettinger, Fox, Loeb, & Taylor, 2017). There was a problem, but the problem was not resolved, or it got even worse. Learning also appears to be relative, and the demand for funding remains like a sword of Damocles above many MOOC initiatives. This does not necessarily mean that MOOCs cannot have any added value, but then, for example, as a tool for learning after the initial studies and perhaps less open.

Underneath this for some old examples, there are also relevant implications for present-day thinking about technology. Besides the mentioned possible effects on inequality, there are more possible ethical issues that should be taken into account, which lead me to the second question I want to add to the Dylan list.

Before and during the pandemic access and privacy were two issues that are often being mentioned when discussing ethics and digital education:

- Access: do all children have the same and/or enough access to digital devices for learning
- Privacy: what happens with the data that is being collected.

But I want to argue that there are much more ethical issues at hand, e.g.:

- As more algorithms are being used to evaluate pupils and students, are we sure that there aren't possible biases in those algorithms than can run against certain groups of students.
- If a teacher grades a student, that teacher will need to be able to explain why a student received that grade. But if self-learning artificial intelligence will be used to evaluate that same student, will we be able to know on what basis a student fails or passes?
- With mass-investments in technology being rolled out, are we not also introducing students to so-called silos? Throughout the world you can find Apple schools, Google Schools, Microsoft Schools, ... I use these labels to describe schools in which most software is from one and the same company or silo. Has this been a deliberate choice or not?
- If you go to a fastfood restaurant it has become common that you order your food on a screen, while in more expensive restaurants somebody will come to your table to take your order. Are we seeing a similar evolution in education where we end up with IRL – contact in classrooms for students from families who can afford this or for better or more experienced students, while children from poorer families get the online alternative?

These kinds of issues cannot be overlooked when introducing digital means in education, and while we often didn't have the time during the pandemic, it's now high time to have these discussions – preferably as a team – to move education forward in a good and effective way.

### **Last, but not least**

Just because something is old doesn't mean it's wrong. This applies to both reactionary tendencies and apparent innovations in education. But perhaps we should not go along with the typical Silicon Valley disruptive thinking in education with the old motto of Zuckerberg's move fast and break things. Not only because Facebook and its CEO now have realized that you end up with broken things that you should not have been broken, but also because in education, we – by definition – bear a great responsibility. That is why I argue pro focusing on improvement and ethics rather than on disruption or innovation. Perhaps it could lead to real new innovations in the near future.

### **Further reading**

Cuban, L. (2009). *Oversold and underused*. Harvard University Press.

In this classic book Larry Cuban argues that when teachers are not given a say in how the technology might reshape schools, computers are merely souped-up typewriters and classrooms continue to run much as they did a generation ago. A point that inspired some of the thinking in this chapter.

De Bruyckere, P., Kirschner, P. A., & Hulshof, C. D. (2016). Technology in education: What teachers should know. *American Educator*, 40(1), 12.

This article is a summary of the different myths about technology that we examined in our book *Urban Myths about Learning and Education*.

Watters, A. (2021). *Teaching machines: The history of personalized learning*. MIT Press.

This more recent book is a feast of recognition of current trends, already happening decades ago.

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