

THE FUTURE OF EDUCATION

FUTURE DIGITALIZATION OF EDUCATION AFTER COVID-19

THE EDTECH MARKET WAS ALREADY
COMPLICATED, AND COVID-19 DID NOT
MAKE THINGS EASIER



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Digitalization already played a major role in public education when COVID-19 forced, to a varying extent across the world, school buildings to close and education to go digital. COVID-19 initiated an unprecedented hastened experiment on school systems. Abruptly, the ongoing digital transformation was accelerated. This created new challenges and opportunities for users (teachers, students, administrators) as well as for suppliers of digital educational material and equipment, impacting demand and supply on the emerging edtech market. Already before COVID-19, suppliers and buyers/users experienced tensions related to digital transformation in their interactions. The tensions emerging from the COVID-19 crisis resulted in actions and interactions in the edtech market affecting future digitalization of education.

Digitalization of education and the shaping of an edtech market

The scale, scope and power of digital transformation as evidenced by phenomena such as connectivity, platforms, algorithmic power, and big data is vigorous. The strong interconnectedness and interdependence between technologies and markets are key features of this transformation.

In only a few months, the pandemic upended the daily lives of people around the world. Public education was among the sectors most affected as pedagogy went digital. For millions of school children, education became based on digital platforms and digital communication. Examples of early comments, referring to the demand side, about this disruption of an already started and ongoing digital transformation were: “the coronavirus pandemic is reshaping education”, “real change takes place in deep crisis”, “you will not stop the momentum (in the digital transformation of education) that will build from the crisis”. There were also early comments about the effects on the supply side, such as “expansion of the emerging edtech market” and “entry of new suppliers”.

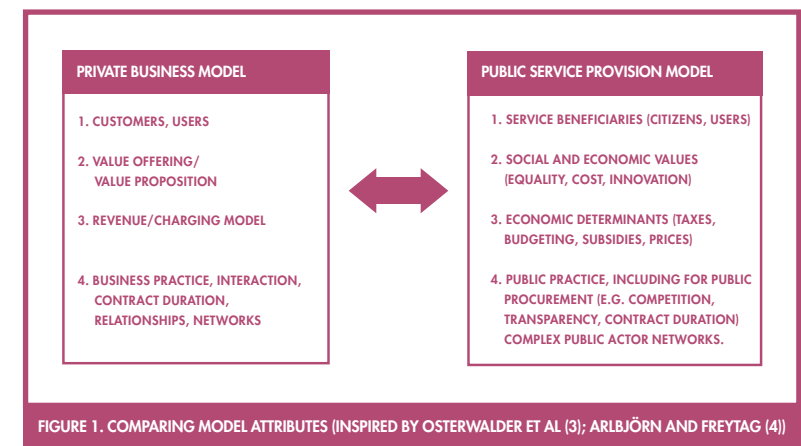
Edtech is the term used to describe the fairly new industry that

combines education and technological advances that allow educational institutions to serve a larger and more diverse audience and to enable teachers, students and others to foster relationships in an interactive fashion. Even if digitized communication and networking in education had started already in the mid-1980s, the shaping of the global edtech market was still in an emerging state of growth when the COVID-19 pandemic struck.

To assist in efforts to understand the post COVID-19 development we refer to our previous research on the pre-CODVID-19 development in which we found tensions revealed in the supplier-buyer/user interaction to be of importance (1, 2).

Tensions revealed in interaction between suppliers and buyers/users

We had observed that a start-up company, Sensavis, entering the edtech market in 2013, changed its business model four times in the following five years. Why? The uncertainty, complexity and inherent dynamics of digitalization will likely result in tensions and pressures to change and adapt both private actors’ business models and the public actors’ service provision model. The concept “public service provision model” includes public procurement as an activity affecting how service is provided to the citizens/beneficiaries.



In Fig. 1 we compare four attributes of business models and public service provision models and illustrate how they form a base for interaction between suppliers and buyers/users.

Various forms of tensions are likely to emerge in connection with digital transformation of public services. Emergence of tensions can be seen as dependent on various ambiguities and contradictions in interaction processes (5). Tensions can originate in the complexities of the public model: which are caused by diverse set of service beneficiaries, mix of social and economic values, budget driven procurement with interdependent budgets and a complex public actor network.

The continuous shifts in Sensavis' business model evolved, driven by the company's interactions with public actors. We could observe how the local public-private interactions were affected by the rather uncoordinated policy shifts at the national level that trickled down to local levels and drove changes in public service provision models, revealing tensions in Sensavis' interaction with public actors. Central public policies were sometimes aimed to increase control, sometimes aimed to provide support for local public operations e.g. digitalization. Sensavis tried to develop closer, value driven interactions with users (initially mainly with individual teachers) about digitalization for improved pedagogy. The company's edtech value offering supported also development of interaction among users: teachers to teachers, teachers to students, students to students. Local public-private interaction was affected by new digital platforms that emerged on both the private and the public side.

The interorganizational complexity of these public-private interactions increased over time. What started as very local digital transformation processes, sometimes involving only single teachers on the public side, turned in the later phases into concurrent local and centrally imposed transformation processes, requiring much more coordinated efforts among public actors. Municipalities needed to take a stronger and more centralized hold of all their schools' digital transformation, including not only teaching but also a variety of school administrative

tasks. The company shifted its value proposition to helping schools and municipalities in their digital transformation processes as a software supply and service support company. Sensavis shifted from a more firm-centric business model to a more network-embedded model as its digital service offering and teaching tool became embedded in a larger, and developing digital infrastructure involving management and administrative systems. Due to this increased complexity, Sensavis experienced increased tensions in interactions with public actors leading it to adapt its value offering.

Summing up, what types of tensions did we observe in the public-private interactions before the crisis?

- Tensions were initially apparent as the internal (digital) technologies of the schools diverged from Sensavis' value offerings.
- Tensions emerged as responsibility for the digital transformation in schools changed and caused structural tensions between the actors within the public systems. There were big differences between municipalities regarding available resources for digital transformation.
- Depending on with which public level (national, municipal, school) that the private business firm interacted with, different types of tensions emerged related to content of the interactions. On the national level (cf. the National Agency for Education), public actors focused more on general societal values, such as equality in education or public vs private schools. On the municipality level, digitalization and school budgets became important. On the school level, pedagogical values were of main concern.
- For Sensavis, the pedagogical values that initially were most important in the interactions with end users were successively complemented with reference to the schools' broader digital transformation challenges.
- In the later phases, Sensavis had to engage in long negotiations with public actors due to the complexities of public procurement. The interactions successively became more complex as digital

transformation took off and ambiguities concerning with whom and how to interact emerged (teachers, headmasters, IT departments, municipality departments etc.).

- Sensavis' service and educational tool offerings became embedded in a larger digital infrastructure development involving management and administrative systems and new digital transformation policies at local, regional and national levels. The increased complexity made Sensavis experience increased tensions in its interactions with public actors.

Enter the COVID-19: early witnesses of disruption in practice

COVID-19 struck just a couple of months ago. Even if systematic observations and research is not available, the media (now in the middle of May 2020) increasingly reports about experiences. The Swedish Schools' Inspectorate (SSI) will publish a report in June and has leaked some preliminary results. We provide some examples from the buyer/user side and from the supplier side respectively.

On the *buyer/user side*, it became apparent that public education systems were not able to deliver online digital education on *equal terms*. Some schools were seen to be better prepared than others. The lack of mandatory standards for online education resulted in a large variation in how different schools were digitized. In some countries and regions, initiatives were taken by central governmental agencies to support on-line learning systems. The crisis cast a bright light on deep inequalities not just in who has devices and sufficient bandwidth, which are critically important, but also who has the skills to self-direct their learning, and whose parents have the time to spend helping. It became a stark reminder of the critical importance of school not just as a place of learning, but of socialization, care and coaching, of community and shared space. The equality issue was also mentioned by SSI.

The quick shift to online learning also drew attention to the value of and the demands on the *teacher-student interactions*, and to the importance of connected interactions e.g. socialization processes *between*

students. As expressed by an OECD representative: "The big question for me is, will we develop an edtech solution that capitalizes on the relationship between students and teachers, as opposed to just broadcasting stuff...". As stated by an Italian teacher: "Being online, I don't think you really get a true sense of whether a student is really engaged and properly understanding, ... , tech hasn't solved that most basic of things." SSI also points to the problem of grading students.

A UK news source summed up *the importance of the social and communication aspects of education*: "... Creating compelling learning experiences for students online requires learning (re)design for the digital age. An essential aspect of in-person learning is conversation. This includes both the formal aspects (public educator Q&As; guided discussions; project work) and informal aspects (peer conversations over coffee; special interest groups) ... it (communication) fosters a community for learners, in which they can explore and discuss ideas with their peers and educators; secondly, it supports students in developing a sense of belonging, which is intrinsically connected to student satisfaction, success and retention ...". SSI also stressed the lack of social interaction among students as a problem.

For schools and subsequently for edtech suppliers, this meant that integrated technical solutions (platforms) had to be provided, including both edtech tools for the content and tools for various types of communication, including group meetings between students.

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From the *supply side*, the COVID-19 crisis much more openly and more deeply revealed what had been often experienced long before the outbreak: the *lack of buying experience* among teachers, school administrators, IT departments, municipalities and other public actors. The crisis exposed this lack of ordering and purchasing experience. The increased demand for edtech tools that could be expected as a consequence of lockdowns did not occur. A US based edtech supplier repre-

sentative complained that most schools and districts hadn't figured out the proper procurement process. Another reason was of course that in many schools in many countries there was still a low degree of digitalization that hindered quick investments in new edtech tools. Schools needed to experiment and discover how the already existing, basic platform tools (like Zoom) could be used in education. Edtech suppliers also became aware of the rigid budget driven routines that existed in the public education systems. Bypassing these rigid budgeting and purchasing routines was difficult, especially for small edtech suppliers without any pre-existing, long-term agreements with buyers. In Sweden, some suppliers found ways to "piggy back" suppliers with existing relationships with buyers. Another way was to offer help in educating the buyer. The Swedish edtech industry organization, Sweden Edtech, developed purchasing templates and instructions to support and educate public edtech buyers.

In many countries, suppliers offered their software tools for free during a limited period of time to raise the overall level of adoption of new technologies. Edtech industry agencies, like Sweden Edtech, created online systems to support both new and established users. Edtech suppliers had to adapt their business models to be compatible with the buyer/user side's need for integrated "learning platforms", involving both the large number of new, small and specialized startups and the global internet giants (Microsoft, Google, Apple etc.).

COVID-19 became a sharp reminder that the *edtech market was emergent*, meaning that suppliers' positions were far from stabilized. There was a very large number of small, specialized venture capital financed startup firms alongside the big, global internet giants that competed for *platform dominance* in the global arena for education on all levels. Furthermore, small startup firms experienced problems in meeting the increase in demand during COVID-19. One solution was to *increase cooperation between suppliers* in the edtech sector, which in Sweden was helped by the industry organization Sweden Edtech. A similar initiative was also taken on a Nordic scale. Nordic Edtech Com-

munity announced that a new cooperative venture between mainly small Nordic edtech companies had been formed ("Tech Millions" – "Nordics join forces to support educators globally with free learning tech"). The idea was to offer free technology from 100+ different Nordic companies as a form of emergency aid and free of charge as long as the COVID-19 crisis continued.

When the storm of the pandemic has passed, schools may be revolutionized by this experience. Or, would they revert back to old and since long established structures and practices? This question is addressed in the next section.

Long-term effects on edtech markets, education systems' digitalization and public-private interaction after the COVID-19 crisis?

Above, we gave a few examples about early experiences of acceleration of digitalization due to COVID-19. Some examples gave indications of long-term effects on digital transformation of education. Below we illustrate some speculations about the future.

Speculations about the crisis leading to innovation in education systems. The World Economic Forum on the 13 of March 2020 stated that the slow pace of change in academic institutions before the crisis had been apparent, but that COVID-19 might become a catalyst for educational institutions worldwide to search for innovative solutions, technical as well as pedagogical, in a relatively short period of time.

Speculations about public-private educational partnerships growing in importance. While most public-private initiatives before the crisis had been limited in scope, and relatively isolated, WEF (ibid) believed the pandemic would pave the way for much larger-scale, cross-industry coalitions to be formed around common educational goals. Examples of such emerging coalitions with diverse stakeholders that included governments, publishers, education professionals, technology providers, and telecom network operators.

Speculations about a definite disruption of traditional education and schools now being forced to accept and adopt digital technology.

Discussions among entrepreneurial companies in the global, growing edtech market speculated that the crisis would lead to a definite acceptance of digitalization as a disruptive force with no turning back. “Schools will have no alternative but to give up the notion that they can run without technology. Their best bet will be to use technology to improve their processes, make education more student-centric and empower their teachers.” (Entrepreneur India2)

Speculations about teachers becoming more empowered through the new technology. There will be a new blend of technology based and direct interaction based learning and education, something that would strengthen the role of teachers: “Going forward, teachers will embrace technology to not only learn themselves but also engage with their students. Teacher training will move to a blended model that combines the power of online, on-demand learning with a few in-person practice sessions. This will be a significant departure from the current on-schedule, annual training calendars that most schools follow and that no one is missing during the Covid-19 era.” (ibid).

Speculations about future student integrity, and data-based personalization making teaching more student-centric. How will school systems react when understanding that technology could also be used to increase control and supervision of students? On the other hand, how could technology be used to personalize education and thereby strengthening the individual development of students.

Speculations about whether the small entrepreneurial edtech suppliers will need to cooperate much closer, in order to interact more effectively with the public buyer/user side and to position themselves more strongly in relation to the global tech giants that aim for new roles in the world’s education systems.

Speculations on a national policy level concerning the long-term consequences for equality of education due to the shift to distant learning. Teachers, schools, municipalities and regions had reached different levels of digital transformation already before the crisis, and there were discussions about whether this divide had increased or decreased

as a result of the crisis.

Speculations also have emerged about the economic effectiveness of digitalization in the school system at local and regional levels, for instance the possibility to keep schools in low density school districts by partly using distance learning.

Conclusions and recommendations

We refer to Fig 1 above, which illustrates different types of tensions that are observed and are needed to be addressed in interaction between private business models and public service provision models.

It might be difficult to identify tensions since public-private interactions *shift over time* as new knowledge (technical, economic, pedagogical, organizational) develops and depends on what *organizational levels* that are involved. Our analytical framework in fig 1 might be helpful to understand the type of tension, how and **when** to handle it, by interaction between public and private actors, by interaction between public actors, and between private actors.

To exemplify, we have selected tensions that refer to observations during the crisis and speculations about post COVID-19 developments.

1. The COVID-19 crisis has created tensions between existing business practice (4) and public procurement practice (4) related also to existing public budget practices (3). A rapid shift to distant education put pressures on schools to start using existing digital solutions but also expanding the use of them. However, strict budgeting procedures (e.g. fixed temporal procedures) resulted in edtech suppliers shifting their revenue model (3) and offering their services for free (at least temporarily). This has caused tensions concerning what this shift in practices will lead to after the crisis.

Implication: One way to act on this tension is for public actors (on different levels) to adapt purchasing and budgeting routines to the fact that e.g. digital tools and platforms in schools need to be constantly updated. The time when textbooks could be budgeted for and ordered once

a year need to be replaced by other procedures, probably more continuous processes, contracts and routines for updating existing digital tools and platforms.

2. The COVID-19 crisis has also created tensions in the public service provision model as the rapid shift to digitalized education has revealed sometimes large inequalities (2) within national school systems regarding digitalization maturity, experiences and resources available for students. The crisis has put the spotlight on large "digital divides" between schools, and between municipalities/regions concerning the preparedness to shift to digital distance education. Suppliers have become more aware of the big differences between customers/users (1) and that their value offerings (2) need to be adapted and implemented in different ways. Small suppliers became aware of the need to cooperate in organized networks (4). Public service practice (4) also needs consideration.

Implication: These tensions need actions on both sides. Public authorities (probably on all levels: state, regional and municipal levels) need to consider how they should be able to support less developed schools/regions in order to hinder that the crisis leads to even greater inequalities due to differences in digitalization. At the same time, suppliers need to be able to develop more user adapted support systems (separately or jointly with other suppliers), adapting to users' varied levels of digital maturity.

3. The COVID-19 crisis has also accentuated the tensions associated with the suppliers' value offerings/value propositions (2). The rapid shift to digital education has started discussions on the pedagogical value (and also potential negative consequences) of digital learning tools and communication platforms in education. A positive effect of this discussion is how the crisis has shown that schools need better, more informed knowledge about the pedagogical values and consequences of digitalization. This in turn has put public pressure on supp-

liers to provide part of that knowledge. Public procurement practices (4) have been forced to adapt and become more involved and better informed.

Implication: The implication of these tensions is that suppliers need to become even more knowledgeable about pedagogical values of their edtech offerings, a process that we could see started already before the crisis as edtech suppliers started to cooperate with academic researchers in pedagogy science. Similarly, the implication for public actors is that a similar competence needs to be developed among the individuals involved in the buying and implementation processes.

4. In addition to the tensions described in point three, the COVID-19 crisis has also opened up for new ways to understand the "customers" and "users" (1) among edtech suppliers, and new ways to identify who the actual "users" (1) are on the public side. The rapid shift towards digital education and communication between teachers and students has opened up new modes of interaction. Digitalization has opened up for novel forms of interactions between teachers and students, between teachers, and also between students. These new modes of interactions are at the core of the digitalization of school systems and has already had effects on e.g. suppliers' value offerings (2), providing edtech platforms that allow for more intense exchange of (digitalized) teaching experiences between teachers (even in different parts of the world), as well as for dynamic exchanges between students.

Implications: One important implication of this is that the crisis also could be a good opportunity for edtech suppliers to transform these experiences of new forms of interactions into new innovations. In a similar way, for the public side and its schools and teachers, this might also be an opportunity to start experimenting a little bit more with education procedures based on these new forms of interactions, opening up for new pedagogical ways to teach and learn.

Looking forward

Based on digitization, there is an ongoing digital transformation, i.e. a rapidly growing use of rapidly changing digital technologies in society at large. Digital transformation in society encompasses all aspects of business and government activities. Digital transformation is associated with innovation in a broad sense. Innovations, i.e. new ways to create value, always require some new combinations of resources controlled by interacting private and public actors. Examples relate to mobility, health care, city planning, even city lighting. Firms need to develop business models for new forms of cooperation and partnerships, with private as well as public actors. Likewise, on the public side, service provision models, e.g. public procurement practices, need to be re-evaluated. The COVID-19 experience of rapid digitalization of education shows the need to consider and address the tensions revealed when public services of any kind become increasingly dependent on digital technology.

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