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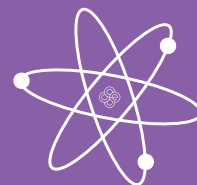
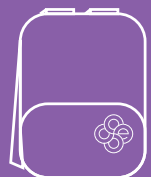
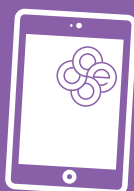
Educating For A Digital World

Report on the State and Needs of Education 2018-2020

November 2021



Québec 



Educating For A Digital World

Report on the State and Needs of Education 2018-2020

You can access the report at www.cse.gouv.qc.ca or request a copy from the Conseil supérieur de l'éducation:

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Message from the Minister of Education

François Paradis

President of the National Assembly

Parliament Building

Québec

Dear Sir,

In accordance with the *Act respecting the Conseil supérieur de l'éducation* (CQLR, c. C-60, section 9), I am pleased to send you the report of the Conseil supérieur de l'éducation on the state and needs of education for 2018–2020.

Sincerely,

Jean-François Roberge

Minister of Education

Québec, November 2020





Maryse Lassonde

Message from the President of the Conseil supérieur de l'éducation

Jean-François Roberge
Minister of Education

Danielle McCann
Minister of Higher Education

Parliament Building
Québec

Dear Ministers,

In accordance with the *Act respecting the Conseil supérieur de l'éducation* (CQLR, c. C-60, section 9), I hereby present the report of the Conseil supérieur de l'éducation on the state and needs of education for 2018–2020.

Sincerely,

President,

A handwritten signature in blue ink that reads "Maryse Lassonde". The signature is fluid and cursive.

Maryse Lassonde, O.C., C.Q., Ph. D., MSRC
Québec, November 2020



Conseil supérieur de l'éducation

Created in 1964, the Conseil supérieur de l'éducation du Québec is an independent government organization made up of 22 members from the world of education and other sectors of Québec society. It was established as a think tank on all matters relating to education with a view to developing an overarching vision of needs in the field and providing advice to the Minister of Education and the Minister of Higher Education.

The Conseil has five commissions, by education level or sector: preschool and primary education, secondary education, college education and research, university education and research, and adult and continuing education. There is also a committee whose role is to prepare a systemic report on the state and needs of education, which is then adopted by the Conseil and tabled every two years in the National Assembly. Created in 2020, the ad hoc inter-level student Comity enriches the Conseil's thinking by further involving the next generation of students in its reflections, activities, and preparation of publications.

The conclusions of the Conseil supérieur de l'éducation are the result of deliberations among its members, which are informed by literature reviews, research findings, and consultations with experts and education stakeholders.

More than 100 people contribute to the Conseil through their civic engagement and volunteer work.

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Abbreviations and Acronyms

AI	Artificial intelligence
ALC	Active learning classroom
APOP	Association pour les applications pédagogiques de l'ordinateur au postsecondaire
APSDS	Association pour la promotion des services documentaires scolaires
BAnQ	Bibliothèque et Archives nationales du Québec
BCI	Bureau de coopération interuniversitaire
BYOD	Bring your own device
CEFRIO	Centre facilitant la recherche et l'innovation dans les organisations
CNIL	Commission nationale de l'informatique et des libertés [France]
CSE	Conseil supérieur de l'éducation
CSQ	Centrale des syndicats du Québec
CRIRES	Centre de recherche et d'intervention sur la réussite scolaire
DAP	Digital Action Plan for Education and Higher Education
DL	Distance learning
EDTEQ	Entreprises pour le développement des technologies éducatives au Québec
ÉER	École en réseau
FCE-CTF	Fédération canadienne des enseignantes et des enseignants/Canadian Teachers' Federation
GAFAM	Google, Amazon, Facebook, Apple and Microsoft [Big Tech]
ICT	Information and Communications Technology
ITS	Intelligent Tutoring System
IWB	Interactive whiteboard
MEES	Ministère de l'Éducation et de l'Enseignement supérieur
NWT	Northwest Territories
OECD	Organisation for Economic Co-operation and Development
OER	Open Educational Resource
QEP	Québec Education Program
REBICQ	Regroupement des bibliothèques collégiales du Québec
RÉCIT	Réseau, Éducation, Collaboration, Innovation, Technologie network
REPTIC	Réseau des répondantes et des répondants TIC [Fédération des cégeps]
TPACK	Technological Pedagogical Content Knowledge
UNESCO	United Nations Educational, Scientific and Cultural Organization



Introduction

“[...] the digital world is a space in which we live. It is no longer about tools at the service of outdated practices, but rather an environment in which we are all immersed and drives and shapes our world and culture” (Vitali-Rosati, 2014, p.27, free translation)

Twenty years ago, the Conseil supérieur de l'éducation (CSE) released a Report on the State and Needs of Education devoted to the integration of new technologies into teaching and learning. It noted then that these technologies had the potential to usher in, promote and enhance desired changes in education, such as challenging didactic instruction and **shifting the paradigm from teaching to learning** (CSE, 2000). Yet from preschool to university, some teachers still considers technology to be optional in the classroom. Moreover, the rollout of the competency-based approach remains a patchwork effort at best.

The 2000 Report on the State and Needs Of Education grouped its recommendations under four major courses of action:

- Clear ministerial **policy directions**;
- **Development of multimedia content** related to Québec curricula and education programs;
- **Adjustments to teacher training and development**;
- **Renewed funds for Research on technology in education** (CSE, 2000).

The Conseil consequently notes that the recommendations it made 20 years ago remain valid today. At the same time, given the importance digital technology now has in our daily lives and how it defines work and society, new concerns have emerged. We now have to question its use and implications and address ethical issues to educate—not only *via* digital technology, but more importantly *for* a digital world. In this respect, the importance of some basic competencies becomes decoupled. As a matter of fact, we now speak of information competency, digital literacy and literacy in a digital context.

Given its intrinsic potential and the changes it drives, digital technology cannot simply be the latest gadget on a list of audio-visual innovations used as teaching aids, particularly in distance learning. Digital technology is much more than a tool; it has revolutionized many aspects of how we live and now wires and powers our world—and this is not without consequences.

First, technology has transformed the way we access information and knowledge. Using it is increasingly required to receive many services and exercise our citizenship. Yet the current crisis caused by the COVID-19 pandemic perfectly illustrates that in times of need, not everyone is adequately equipped to cope with this new reality, raising concerns on the development of competencies and aptitudes for mastering information, active citizenship and lifelong learning. Digital inequality is no longer defined by access to infrastructures, but has more to do with the new faces of literacy, and impacts people differently depending on gender, socioeconomic background or culture.

Second, digital technologies, including artificial intelligence (AI), are also significantly more powerful than they use to be (UNESCO, 2013). This raises not only high expectations for learning (Amadiou & Tricot, 2014), but deep concerns as well (Bihouix & Mauvilly, 2016). The digital debate indeed often oscillates between keen interest and deep mistrust, two extreme poles on a gamut of opinions, values and beliefs. To gain a better understanding of the challenges faced by the implementation of Québec's Digital Action Plan for Education and Higher Education (DAP), all these differences must be considered first.

Given the speed with which technology evolves, the education system cannot continue to settle for it as simply a lever for learning, as this would reduce its use to a question of individual preference. We must now think above all in terms of **new roles** for digital technology in education, to ensure that all people have—at any time in their lives—the opportunity to develop the necessary skills to adapt to the world as it evolves, and fully benefit from its positive and enlightened use.

To this end, Québec's Digital Competency Framework can serve as the foundation for rethinking a better alignment of curricula, learning and evaluation activities. For education communities to meet this challenge, however, some conditions must first be fulfilled in order to meet basic needs.

1 Learning in the 21st Century

The [Right to Education](#) argues that to meet the needs of students, education must be flexible and responsive to a changing society (UNESCO, 2015). One of the responsibilities of the education system is to therefore empower people to develop the necessary skills and abilities to lead a fulfilling life (Secrétariat du PME, 2017) and become full participants in the world we live.

The Canadian Teachers' Federation [surveyed](#) its members on the repercussions of school closures due to COVID-19 during the spring of 2020. Of the 18,000 participants, 92% of those who responded to open-ended questions felt that the lack of access to technology and necessary equipment were barriers to an equitable and quality public education (FCE-CTF, 2020).

During the pandemic which gripped the planet in the spring of 2020, digital technology proved to be crucial, as it allowed not only working from home, continuing some educational and business activities, maintaining social ties, but also accessing essential services, cultural events and entertainment. A 2020 Canada-wide [Léger survey](#) found that almost one in five respondents took advantage of the lockdown to start doing activities online, with the vast majority of them intending to keep doing so. While some solutions will thus survive this crisis, it also laid bare some troubling inequities, particularly in education. On the one hand, the situation will continue to exacerbate digital inequality in some groups, on the other, this inequality is a major risk factor in terms of vulnerability, not only to the virus itself but to the non-medical effects of the crisis as well (Beaunoyer, Dupéré & Guitton, 2020).

Today, anyone who has the appropriate tools and necessary skills can now access knowledge primarily through digital means, and the education system can no longer treat this new reality in the abstract.

In a perspective of lifelong learning, **learning today must therefore involve the proficiency of tools and competencies that have taken on a new importance in the 21st century.**

The opening chapter of the present Report on the State and Needs of Education will focus on two fundamental aspects of this transformation that have implications for teaching and learning. First, the important role that distance learning will be required to take on; as the latter is emblematic of a long-needed change in mindset for education, this provides an opportunity to revisit basic elements of this change. A section will then be devoted to artificial intelligence, not only as it is likely to alter the work of teachers, but more importantly because the public needs to become more aware of issues surrounding big data and be better equipped to make informed decisions.

1.1 Distance Learning: Essential to Lifelong Learning

Where distance learning (DL) was once complementary or an alternative to traditional programs of study, it has now become an integral mode of education, both formal and informal (Bozkurt, Akgun-Ozbek, Yilmazel et al., 2015). In addition, the accelerated pace of technology is spurring the need for workforces in many sectors to continually train and upskill, and DL is increasingly responding to this need (OECD, 2020; Parr, 2019).

In its brief on DL offered in Québec universities, the Conseil defined it as: “an activity which involves, to a certain extent, a decoupling of teaching and learning in space and time (Jacquinot-Delaunay, 2010)” (CSE, 2015, free translation). In fact, DL has existed ever since it was possible to communicate with a large group of people without all of them needing to be assembled in the same place at the same time.

Over the years, means and media have succeeded one another to achieve this objective. Indeed, all information and communication technologies (ICTs) since the postal service—from the radio to the World Wide Web—have been used to deliver DL. Electronic communication via the Internet has now surpassed all other means so much so that the term “online learning” is as ubiquitous today as “correspondence course” was in the past. Consequently, there is a tendency to conflate DL with the technology that enables it. Nevertheless, **this mediation by technology appears to be a distinguishing feature of DL.**

In the beginning, DL was intended as a **social project** to make education remotely accessible to people living far from teaching institutions or unable to attend during class hours. Today, DL is more about balancing study, work and the various aspects of personal life. Université TÉLUQ and Cégep à distance were both created specifically to address this need for flexibility by learners such as student athletes, people with disabilities or members of the military. DL institutions are not alone in offering this type of education today; in fact, most enrolment in DL programs in Canada is in so-called dual-mode universities, which offer DL in addition to traditional programs.

Québec’s 2018 Digital Action Plan for Education and Higher Education (DAP) includes three key measures related to DL: “foster the development of distance education at the elementary and secondary levels”, “bring together distance education offerings at the college and university levels”, and “foster the sharing of expertise in distance education” (MEES, 2018c). This massification of DL, however, is not without its challenges—such as being beholden at times to economic priorities. In fact, institutions of higher learning (as well as those offering vocational training and adult general education) operate in a competitive environment where DL can be tied to funding rationales and market shares—not exactly conducive to pooling the DL offer nor sharing DL expertise as set forth in the DAP.

Moreover, DL should not be viewed through the lens of economies of scale, as this risks it being developed as a virtual substitute for the regular classroom, without any real consideration given to the changes needed in the teaching practice.

1.1.1 Issues of Quality

As the health crisis in the spring of 2020 led to the closing of educational institutions, a worldwide **coalition** was launched to accelerate the rollout of distance learning (DL) (UNESCO, 2020). Yet teaching replicated at a distance in an emergency situation should not be confused with instruction truly designed to be delivered remotely (Hodges, Moore, Lockee et al., 2020). What was proposed during the pandemic was not planned as DL *per se*—these were stop-gap solutions that may even end up **tarnishing DL's name** (Raybaud, 2020). In fact, to indicate that this “temporary compromise to maintain educational continuity” is not DL in the strict sense of the term, Université du Québec en Outaouais favours the term “**not in-person instruction**” (Syndicat des chargées et chargés de cours de l'Université du Québec en Outaouais, 2020, free translation).

Although DL has surged in popularity over the last decade, research in the field of education on **defining it and its methods** has not been conclusive (Forget-Dubois, 2020a). A recent review of literature shows that courses offered only remotely can have a negative impact on learning. By contrast, the impact of blended (or hybrid) learning is, in general, comparable to that of traditional classroom lessons. The findings of these studies suggest that the right combination of DL and in-person courses could be successful (Escueta, Quan, Nickow et al., 2017). For this to occur, however, course designs would need to be revised accordingly.

In an American review of DL courses, most of those listed tended to follow established teaching methods and replicate the traditional classroom model (Fishman & Dede, 2016). Although expertise is currently being developed on modes of instruction more suited to remote contexts, the situation appears to be the same in Canada, where DL in higher education is still too often delivered following the traditional model due to a lack of adapted pedagogical strategies (Wotto, 2020).

However, DL's key foundational theories initially sought to distinguish it from traditional learning by focusing either on the autonomy of learners, the dialogue needed between them and teachers, or the participation of a knowledge-producing community. In all cases, **the learner takes on a very active role in his or her learning**.

Among other reference frameworks, the community of inquiry is a model for developing DL and hybrid learning environments. This model rests on the principle that the best learning experiences, especially in higher education, take place in a community made up of learners and teachers.

“[...] the rapid change to online instruction could pose challenges for students who were not equipped to adjust to this method of learning, either because they learn better in person, they lack the appropriate tools or they do not have a suitable home environment for learning online” (Statistique Canada, 2020).

The objective of the community of inquiry framework is to **move beyond simply “uploading” traditional courses online** and guide the development of pedagogy adapted to DL or hybrid learning. Teachers would need to familiarize themselves with the options technology has to offer to facilitate critical thinking



and the learning process. In other words, technology must drive change in pedagogical practices and not just support traditional ones, and this change demands adaptation, not only by teachers, but also by learners (Garrison & Akyol, 2013).

The Conseil notes that the **change in mindset needed** to offer adequate distance learning is, generally speaking, the same as that which has been desired for over 20 years for in-person instruction, i.e. shifting the paradigm from teaching to learning (CSE, 2000).

Quality DL results when **courses are entirely redesigned** for the new method, from instruction to evaluation—up to and including schedules and equipment (OSCQR, n.d.)—and when teaching staff has received the necessary pedagogical and technical training and support, **in addition to being supported by a pedagogical and technological team**. Dual-mode universities do offer this support to faculty members who wish to receive it (i.e. on a voluntary basis).

Learning remotely requires a great deal of autonomy, active participation and a strong ability to self-direct. Pupils and students are in the process of mastering these skills, but are currently doing so unevenly. While DL is proving to be increasingly essential in a social environment featuring a multiplicity of education and career paths, it has yet to become a universal formula suited for the entire student population.

The imposition of DL during the pandemic moreover has led to a fear of higher dropout rates in [secondary school](#) as well as in [college and university](#) (Lauzon, 2020), partly due to the fact [DL does not enjoy a good reputation](#) among students (ACPPU, 2020). Consultations carried out with members of the Conseil's own bodies revealed that adult education centres and vocational education centres have seen a spike in dropout rates during the crisis. Some members also fear a drop in enrolment should learning continue to be offered for the most part remotely. This situation underscores the need for developing learners' autonomy and ability to self-direct as well as strategies to retain their engagement. At the same time, teachers need to revise their pedagogy accordingly, and this pivots on support that goes beyond mere proficiency in using technology platforms.

For DL to be effective, teachers need to develop their capability to create [learning scenarios](#) (EduTech Wiki de France, 2019), produce content for a remote context, and contribute to developing skills in learners working in a network (i.e. communication, collaboration, content sharing). They must also learn how to manage the classroom and evaluate differently. All of these DL-related actions—and this cannot be understated—can improve the quality of courses delivered in a classroom as well.

Showcasing Field Expertise

While not distance learning (DL) *per se*, [École en réseau](#) (ÉER) has been operating on DL principles since the beginning of the 2000s. “ÉER’s mission is to support classrooms across Québec and elsewhere in a collaborative network to enrich student digital learning and to actively engage them. ÉER acts as a lever empowering teachers and students in developing their digital competence and 21st century skills through an investigative and co-development approach” (École en réseau, n.d., free translation).

In the same vein, over the past 20 years, the [LEARN](#) organization has developed a DL offer in the Anglophone education sector. The sharing of acquired expertise—particularly the use of technology platforms and teacher support—would be useful to “foster the development of distance education at the elementary and secondary levels” as stated in the DAP (MEES, 2018c).

1.1.2 Issues of Equity

Distance learning (DL)’s objective of accessibility has essentially not been reached. In fact, when mandated without the appropriate support, DL can switch from being a vector of inclusion to reproducing social inequality. The COVID-19 crisis has provided us with many examples of this (Groupe AgiRéussir, 2020).

As the pandemic has confirmed, studying far from venues of social interaction can greatly affect our sense of belonging, motivation and perseverance. Maintaining a positive attitude largely depends on the ability to forge strong ties with the individual delivering the training. When all the necessary conditions are in place, communication can in fact be just as effective—if not better—than some face-to-face learning.

In many definitions of DL, autonomy is referred to either as a personal quality, or as feature or advantage of DL *per se*. However, research on this subject has not clearly demonstrated that DL allows the development of autonomy among the people who practice it (Forget-Dubois, 2020a). It is rather a skill to be learned to fully benefit from it.

Institutions that offer DL programs therefore have a responsibility to implement measures to help learners increase their autonomy. Courses need to be designed in such a way to encourage communication between the instructor and the **learner**. For the latter to be **at the centre of the learning**, a link needs to be created to break the isolation and introduce a human presence in the distance (Jézégou, 2019).

Given the importance DL plays in developing and maintaining skills, in November 2019 the [Government of Ontario](#) had planned to set a minimum number of online courses as a requirement for obtaining a secondary school diploma. However, during labour negotiations with teachers in the winter of 2020, this plan was roundly rejected. DL does in fact introduce significant challenges to working conditions.

Regrettably, the needs of the student population are not always at the centre of decisions to offer DL, nor in the conditions for its rollout. For example, students in some dual-mode universities are having online core courses imposed on them when this is not their first choice, nor something that meets their needs. Ironically, students who leave their regions to study on campus may end up taking most of their courses remotely for an entire term.

“The most significant barrier to online learning was identified as the additional faculty effort required to develop or deliver online courses (85%), followed closely by inadequate training/pedagogical knowledge available for faculty in online learning (73%), then lack of acceptance of online instruction by faculty (62%)” (ACRFL/CDLRA, 2018)

DL also raises issues related to labour relations and working conditions, namely in terms of remuneration and status. In some cases, instructors who deliver remote learning are not considered nor paid the same as other teaching staff members. Nor do they always have access to the same meetings and/or training. This can lead to inequities, particularly in terms of support.

The 2019 [labour dispute](#) at TÉLUQ pivoted around the fact that tutors believed they had teaching responsibilities. **The sensitive issue of status for those taking on distance learning positions** is not unique to this institution. In dual-mode universities, sessional instructors who teach remotely are often not recognized for a full workload, unlike lecturers and professors.

In addition, to be guaranteed a workload, sessional instructors and teaching assistants often find themselves obliged to deliver courses remotely, even when they do not feel adequately equipped to do so. In addition, some professors have to accept that part of their courses will be hybrid: accessed remotely by some students, with others attending in person. Those joining remotely often feel left out of the in-class group dynamic, and learning activities are not always adjusted accordingly.

At the college level, the development of DL is also facing union-related issues: the current workload parameters for faculty are simply not aligned with DL's requirements. For example, preparing a distance course is very time-consuming at the outset, and is typically done while also having to teach full time.

In some adult education centres, teachers may see part of their workload devoted to remote instruction. For this part of their work, they have effectively taken on the status of a tutor, something not covered in collective agreements. The duties for planning content, student support and evaluation, however, are not any lighter when done remotely, and the workload required to properly prepare it is just as involved. **This difference in status does not appear justified.**

What the Conseil Concludes

Distance learning (DL) is becoming essential to lifelong learning or pursuing higher education. Yet many distance courses still take the form of simple uploads of lessons planned for the classroom, with content not necessarily designed for teaching in a remote context or a virtual environment. In addition, teaching staff members may not always be skilled at using technology. **Evaluations still tend to reproduce traditional examinations and assignments** (accompanied by an increased risk of cheating), yet technological tools can make evaluation easier through more complex and authentic tasks. As for learners, they do not all have the interest, motivation, autonomy or even the equipment needed to satisfactorily advance in a DL environment.

A successful integration of DL hinges on the change in pedagogical mindset desired for the past 20 years (CSE, 2000) that would ensure not only quality courses but also renewed management and governance that would steer integration and assure high-quality learning. Measures to prepare all students and all members of the population for this type of learning must also be implemented.

1.2 Educating in an Era of Algorithms and Big Data

“Our school programs and education systems have yet to recognize the shockwave AI’s advances are about to bring to the way we live, work, consume, co-exist, test our legal norms and [...] ethical boundaries” (Taddei, 2018, p.46., free translation)

Movies (Ward, 2019) and **fiction** (Stiebert, 2019) have regularly portrayed artificial intelligence as being equal to or even surpassing human intellect (often at the latter’s expense), possibly replacing us altogether. This understandably raises red flags and questions: “the proliferation of deep learning research and a better understanding of algorithms noted today seem to indicate [...] greater machine autonomy in the coming decades, a trend that is also facilitated by the new availability of big data and much faster processor speeds” (MEES, 2018a, p.3, free translation).

This potential increase in machine autonomy calls for a much broader, collective and pluralistic debate to anticipate potential misuse, raise awareness and educate to prevent misuse. “[F]aced with the development of a computational society, we must encourage expanding statistical culture beyond experts to a much wider public” (Cardon, 2015, p.13, free translation).

1.2.1 Social and Ethical Issues

“Yes, technology is changing culture, but ultimately what it does is expose it, amplify it and reproduce it. Technology is an echo chamber of humanity—the challenges it proliferates are of our making” (Dyens, 2019, p.85, free translation).

“[...] we must first address the legitimate concerns about how AI will be developed and used before we can truly realize its immense rewards. Because at this point in time, the broader public is growing ever more skeptical—and ever more distrustful” (Omnia AI, 2019).

In our daily lives, artificial intelligence (AI) reaches out to us namely through virtual assistants, targeted ads based on our consumer profiles, or the Internet of Things—including [web-enabled toys](#) (CNIL, 2019). These examples suggest that AI is being developed primarily to maximize profit, unregulated and free of ethical accountability. In fact the [GAFAM](#) (Wikipédia, 2020d), also known as Big Tech, are investing massively in AI research. **It is therefore important now more than ever to support academic and independent research in this field.**

Many education players feel there is a pressing need to anticipate potential malicious use of AI. Issues, particularly regarding security, need to be resolved through best practices, and **the number of stakeholders should be continuously broadened to include them in the search for solutions** (Brundage, Avin, Clark, et al., 2018).

“While research is moving full speed ahead on the technical side of AI, not much headway has been made on the ethical front. Though many researchers have expressed concern about this, and some countries are starting to give it serious thought, there is no legal framework to guide future research on ethics on a global scale” (UNESCO, 2018).

The French national commission for information technology and civil liberties [CNIL](#) has issued a number of recommendations in this regard, including **training in ethics at every link of the digital chain, from developer to citizen**. It has also proposed making algorithms easier to understand and designing systems to be at the service of human freedom (CNIL, 2017).

The [Montréal Declaration for Responsible AI Development](#) contains ten principles: well-being, respect for autonomy, privacy and intimacy, solidarity, democratic participation, equity, diversity and inclusion, prudence, responsibility and sustainable development (Déclaration de Montréal IA responsable, 2018).

For its part, the [Ethics Guidelines for Trustworthy AI](#) released by the European Union includes seven requirements: human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being and accountability (High-Level Expert Group on Artificial Intelligence, 2019).

A 2020 Université de Montréal [report](#) outlines the role universities need to assume in responsible AI development. They could, for example, work with civil society and other stakeholders in responsible innovation and review research processes in data security (Régis, Denis, Roy et al., 2020).

According to the [Beijing Consensus on Artificial Intelligence and Education](#), “[...] the development of AI should be human-controlled and centred on people; [...] in the service of people to enhance human capacities; [...] [and] designed in an ethical, non-discriminatory, equitable, transparent and auditable manner.” (UNESCO, 2019a, p.4). This report also speaks to the concerns of people with physical, learning or adaptive disabilities as well as those not studying in their first language. Lastly, it highlights the gap in mastering skills related to AI along gender lines, an issue that may further widen inequalities.



What the Conseil Concludes

While the order and grouping of key concepts may vary from framework to framework, they **all share values and principles prioritizing the common good, transparency and respect for diversity**. Any discussion of these issues must be done inclusively to represent the widest range of views. **Simply put, for the general public AI systems should not remain a “black box”.**

1.2.2 A Transformed Labour Market

“Ever-increasing specialization of machines has led to the automation of tasks typically performed by humans, and consequently to a transformed labour market. Very few types of jobs will be spared from large- or small-scale automation over the next few years” (MEES 2018a, p.1., free translation)

Artificial intelligence (AI) could tackle some of today’s more tedious jobs, freeing workers to perform tasks that require strictly human know-how such as creativity, abstract thinking and problem solving (Villani, 2018).

While professional occupations are at risk of being radically altered (Parnas, 2017), the consequences of this transformation is likely to have a greater negative impact on those with lower levels of education. The challenge thus lies in making sure that those losing their jobs are not left behind without the required skills to fill the new types of positions being created.

“Recent work from this perspective has reached the conclusion that, in addition to the jobs that risk disappearing because of automation, about 34% of current jobs will change significantly as many of the tasks currently performed by workers in those jobs may be automated. This implies that those jobs will shift the balance to non-routine, higher skilled tasks, requiring workers to upskill in order to avoid being displaced and to be able to perform the more demanding tasks. Digitalisation will also lead to the emergence of new types of jobs, and new forms of work, which are likely to require higher skills levels. Thus, it seems unlikely that workers in declining sectors, or those who will be displaced from their jobs, will find a safe haven in these emerging niches.” (OECD, 2019, p.19.)

Curricula and programs of study need to closely follow this labour market transformation and step in to help develop AI skills without losing sight of the importance of reading, writing and mathematics, while recognizing the interdependent nature of disciplines, including the humanities and social science (UNESCO, 2019a).

It would also be a good idea to fully harness AI to develop flexible learning pathways more suited to each individual’s potential and goals—without leaving older workers behind (ibid.).

“The most discussed AI applications in education today are those involved in the analysis of learning. They could provide a better understanding of how learners learn and ultimately the potential of personalizing teaching. This could also help teachers improve their lessons and [institutions] improve their success plans” (Blanc, 2017, p.40, free translation).

As periods of rapid change oftentimes also include a stage of bereavement, people will need to be guided and supported in adjusting to a change that at times may radically turn their professional identity upside down, transform their role and force them to relinquish some aspects of their job they are particularly attached to.

Regulating AI—or limiting its use—will not solve behavioural problems created by culture or society. This is not the way to equip people for a well-reasoned use of AI and protect themselves against any potential malicious use (Cardon, 2015; Eubanks, 2018; Gilbert, 2020; World Economic Forum, 2019). The best way to safeguard against misuse is to be receptive to these changes—which may occur a lot sooner than we think.

“The majority [of Quebecers] (61%) [...] claim they are willing to take training to adapt to this technological dislocation. Men (67%) are more favourably disposed than women (54%), as are those under the age of 54. The higher the level of education, the more willing they are to take such training (i.e. 68% with a undergraduate degree and 71% with a Master’s or Ph.D”) (De Marcellis-Warin & Peignier, 2018, p.43, free translation).

1.2.3 Opportunities for Education

“In education, consideration of cross-curricular competencies, learning creativity, and new pedagogical methods is all too often sorely lacking. We are at the dawn of a major transformation in teaching and training, without which we will not be able to deal with the development and spread of AI.” (Villani, 2018, p.106, free translation).

Many types of artificial intelligence (AI) have been used in education for some time now. **Intelligent Tutoring Systems (ITS)** can prompt learners who are unsure or are stuck solving a problem, and guide them through their learning. Through automatically corrected tests, **automated evaluation tools** can provide information on skills and aptitudes developed during the learning process and pinpoint the strengths and weaknesses of learners. **Collaborative learning environments** offer both the necessary setting and the tools for interacting and working as a team. For its part, **play-based learning** makes possible activities which would not otherwise be feasible with traditional resources due to budgets, time and available infrastructures, as well as safety (Sanchez & Lama, 2008).

There is also increasing interest in **intelligent adaptive learning** (Meilleur, 2018), systems that can adapt in real time to the skill, level, and needs of the learner. For instance, smart tutorials can adjust to a student’s pace of learning, something particularly useful for those with physical, learning or adaptive disabilities. ITS or chatbots can also mimic human behaviour effectively in many fields and disciplines (TÉLUQ, 2020).

“Adaptive learning is [...] an educational technique that leverages AI to organize learning around the individual skills or needs of each learner. [...] The concept is simple: learning paths constantly evolve, depending on the responses provided by the learners, their needs, their characteristics, etc.” (Karsenti, 2018a, p.115, free translation).

Learning analytics use learning data (results that teachers upload to a portal or traces that learners leave on it) to follow a learner's path with personalized, metacognitive, smart and efficient feedback (Scapin, 2018). *École branchée* provides many concrete examples of this (Miller, 2019). In other words, **learning data can provide an individualized follow-up to identify problems the learner is having and to proactively respond in real time** (Scapin, 2018). AI can also boost differentiated instruction and allow to pair individuals most likely to help each other and ensure their interactions stay pedagogically relevant (Van Ranst, 2019).

Lastly, learning analytics could transform traditional evaluation methods largely made up of exams, as it allows to continuously verify what has been learned and what remains to be learned (Karsenti, 2018a; Miller, 2019).

There are many applications available, then, that could be used to improve learning. **The major challenges for teachers lie in finding these applications, assessing their pedagogical relevance, revising course design and activities accordingly, rethinking learning evaluations and developing appropriate teaching scenarios.**

This is an opportunity for education to lead people in being more involved in their learning. It is also a good time to teach them to understand how AI feeds on the data we provide it daily.

1.2.4 Preventing Misuse

“Predictive models are only as good as the data from which they are created, and these data have a complicated history” (Dyens, 2018, free translation).

The use of personal data is freighted with implications: data privacy, the profiling and cataloguing of individuals, bias, increased inequality and the concentration of power (Cardon, 2015; Eubanks, 2018; Gilbert, 2020). In education, as in all other fields, people have the right to know how their data are being managed or used and opt out should they wish to (FACiL, 2018). All employees who access this information must also be trained on data protection and understanding the algorithms these data feed.

“The development and use of AI in education should not deepen the digital divide and must not display bias against any minority or vulnerable groups” (UNESCO, 2019a, p.7).

In a world where available information never ceases to reproduce itself, our access to this information is primarily filtered through preferences gleaned from our online behaviour. This is the **filter bubble** theory advanced by Eli Pariser (Wikipédia, 2020b). People need to be much more aware of the fact that the Internet suggests content that tends to echo our beliefs, ideologies and **cognitive biases** (Wikipédia, 2020a).

To counter this, students need to be immersed in a collective approach in the search for definitions in order to draw their own conclusions by considering many different points of view. This is not about telling students what to think but rather **pointing out possible ways to think** (RÉCIT, n.d.) and fostering the development of their critical thinking. Given that cyber-security largely depends on behaviour, all individuals must also learn to protect their data and those of the people they are responsible for.

1.2.5 Anticipating the Future of AI and Protecting People's Power to Act

“Everything that technology makes possible tends to turn into an obligation in our lives, as these possibilities shape the world according to their inherent characteristics. Technological power imposes its own pace, rationale and dynamics” (Goulet, 2018, p.231, free translation)

More than a decade ago experts were already predicting that artificial intelligence (AI) in education would be able to provide cognitive diagnostics on learners, positioning them in their learning paths and providing them with individualized support (Sanchez & Lama, 2008). The present concern of AI is centred around its potential misuse, not necessarily from the technology itself but rather from its developers and how it is used (Sijing & Lan, 2018). Hence, a few recommendations different stakeholders can keep in mind:

- **Programmers** must place the individual first in developing any AI-based system, by ensuring that any decisions taken by their system respect human rights.
- **Learners** need to have the opportunity to develop their digital literacy for them to fully grasp different AI-related issues, particularly those of an ethical nature.
- **Teachers** must assume two distinct responsibilities: first, they must act as a guide in each learning situation/problem, approached from multiple angles (i.e. ethics, benefit, values) and driven by ethical considerations (Burton, Goldsmith, Koenig et al., 2017). Second, teachers also need to continually expand their own understanding of ethical developments in AI.

What the Conseil Concludes

Teaching is not a profession currently in any danger of being replaced by artificial intelligence (AI). There is little doubt, however, that the role of the teacher needs to be reimagined. Although their real use in classrooms is still on the distant horizon, digital technology in general and AI in particular will intensify the need to shift from instruction founded on imparting knowledge to a pedagogy that supports the development of competencies.

To avoid being trapped in filter bubbles and retain the right to say how personal information can be used, the general public also needs to understand how algorithms work. People must be able to be vigilant to ensure the development of AI is achieved with due regard for diversity and the individual. Education thus has a vital role in ensuring that AI systems do not remain a “black box”.



2 Digital Inequality

“Digital inequality reflects [...] to a great extent pre-existing social disparities, at times even amplifying them. The digitally disadvantaged are thus first and foremost those who are ‘socially disadvantaged’” (Brotcorne, 2020, free translation).

“For example, new digital vulnerabilities are emerging and we need to prevent them by educating our youth on how new technology can be wisely and ethically used and how to become responsible digital citizens” (Yagoubi, 2020, p.149, free translation).

As the themes discussed in Chapter 1 have shown, the issue of digital inequality today is complex. No longer solely about unequal access (i.e. bandwidth speed, the number and reliability of computers in the home), digital inequality is increasingly about the quality of use and knowledge of online behaviour. It affects the ability of people to safely and effectively use digital technology to broaden their knowledge, exercise their citizenship, even access services they are entitled to, while respecting others and protecting their privacy. Sadly, digital inequality is not going to disappear on its own any time soon. It has a direct correlation with social inequalities (Collin, Guichon & Ntebutse, 2015), from which young people are not spared (Yagoubi, 2020).

Thus, it must be reiterated at the outset that while access to technology itself may no longer be the biggest challenge in digital inequality, other forms of inequality remain a problem.

The Canada Research Chair in Digital Equity in Education describes three different levels of inequality: in having **access** to technology and the type of accessible technology; in **knowledge**, corresponding to the extent of technological skills and uses an individual can leverage; and in **power**, related to the individual’s ability to benefit from these skills and use them to serve his or her own interests and capital (Collin, 2013, free translation).

2.1 Geographical Inequality

One of the promises of digital technology is access to higher education—via distance learning—in remote areas far from urban centres. However, most Canadian homes without an adequate connection or access to the Internet are found precisely in rural or outlying regions (Hadiristic, 2017). Thus, most Inuit students who had to return home in the spring of 2020 because of the COVID-19 pandemic were unable to finish their term remotely.

As of 2016, around 340,000 Québec homes did not have access to high-speed Internet (Ministère de l'Économie et de l'Innovation, 2017). Federal and provincial investments for bringing broadband to every region of Québec by 2022 are lagging behind and have exceeded budgets (Porter, 2019). Furthermore,

While the *Cégep à distance* program requires a moderate Internet connection and can work on slightly out-of-date IT equipment, distance learning in some universities *requires a more recent computer, high-speed Internet connection and web camera*. The offer of university education in many rural and outlying regions—home to many Indigenous communities (Hadjiristic, 2017)—could therefore be jeopardized. Although improvements are in the works, limited access to high-speed Internet connections remains for the moment a factor of exclusion for some communities.

the objective of the federal *Northern Component of Connecting Canadians* program—which includes Nunavik—is to deliver a download speed of barely 3 Mbps (Government of Canada, 2016). Northern villages still in fact rely on slower satellite connections to access the Internet.

Also, Québec adults who rarely or never use the Internet are concentrated in the lowest-income segment of the population or have lower levels of education (CEFRIQ, 2019b). The fact they represent only a small minority is no reason to ignore them, however—like education, access to technology should be entrenched as a fundamental right in charters, given the current context and changes looming on the horizon (Dyens, 2019).

2.2 Sociocultural Inequality

In terms of culture, digital usage remains very gender-based, pitting girls' culture against boys'. Girls prefer communicating on their cell phones while boys tend to use computers or consoles to play games online. Additionally, boys show more interest in developing their digital technology skills. Boys also significantly outnumber girls (44% to 16%) in having taken coding courses. As girls appear more interested in using software to develop their creative skills, combining arts with sciences and focusing on digital creativity could pave the way for boosting the number of girls in this field (Yagoubi, 2020).

The under-representation of women in engineering, pure, and applied science carries over into the computer science field as well. This threatens to become a vicious circle: the fewer girls and women active in the digital field, the less likely they will be able to influence its rules and the less they will fit in. Indeed, for the 2018-2019 academic year, the rate of women in computer science undergraduate programs in Québec stood at just 19%, with 16% in computer engineering and 6% in computer and electronics technology (Belletête, Pelletier Nolet, Brodeur et al., 2020). The number of women in university computer programs has even dropped globally (West, Kraut & Chew, 2019). Paradoxically, according to the International Computer and Information Literacy Study, girls are outperforming boys (Gebhardt, Thomson, Ainly et al., 2019).

There appears to be a sociocultural correlation here, including factors such as being encouraged at home and by peers, as well as opportunities to take part in computer science courses (Hadjiristic, 2017). Like science and engineering, computing is believed to require more natural intelligence than hard work (Leslie, Cimpian, Meyer, et al., 2015). Girls, in fact, tend to internalize stereotypical views that they are less naturally gifted in brilliance, as early as the age of six (Bian, Leslie & Cimpian, 2017). "Fortunately, studies also show that greater experience with computers results in improved attitudes

among girls” (UNESCO, 2013, p.17.). These findings support the need to begin activities around digital skills in all subject areas earlier to achieve first and foremost a more balanced gender representation (West, Kraut & Chew, 2019).



Women are not alone in experiencing discrimination in the digital field. A number of international studies have evidenced the under-representation of some minority groups in science, technology, engineering and mathematics programs (Conference Board of Canada, n.d.; Estrada, Burnett, Campbell, et al., 2016; Estrada, Hernandez & Schultz, 2018). This imbalance primarily affects African, Hispanic or Indigenous communities. Many incidents in recent years have also brought to the fore artificial intelligence’s bias or weak performance in analyzing photographic data of persons of non-European origin, due to a lack of diversity in training data (Zou & Schiebinger, 2018). The same applies to data in languages other than English. This data bias can be attributed in part to the same lack of diversity among those writing algorithms (Eubanks, 2018; Gilbert, 2020).

While the under-representation of women in science programs in general and computer science in particular are well documented in Québec (Belletête, Pelletier Nolet, Brodeur, et al., 2020), the same cannot be said for ethnic communities. As the under-representation documented elsewhere could occur in Québec, an analysis of the situation and development of intervention programs would be advisable to stem the brain drain critical to filling jobs created by the digital economy.

2.3 Inequality in Usage

At the start of the new millennium, studies by the American sociologist Ezter Hargittai revealed that: “digital inequality is a reproduction of social and cultural inequality. She introduced the term ‘second-level digital divide’ to define the widening gap between children from disadvantaged communities who tend to have limited use of digital tools and those more fortunate who have earlier access to digital environments and benefit from a range of home uses which enables them to adopt practices closer to what is expected in school (being familiar with word processing, for instance)” (Cordier, 2015, p.60, free translation).

The results of a Québec survey of parents with school-age children shows that “not all children benefit from the same tools, be they in terms of digital devices or parental support” (CEFRIQ, 2016, p.19, free translation). The survey also found that “digital integration is more advanced in private schools than in the public education system” (ibid.).

A study of Québec families shows through an [interactive website](#) that while many parents see themselves as “seasoned captains” or “capable sailors” in navigating the Internet, one-third of them considered themselves as simple “landlubbers”, with some sure to sink in a shipwreck. “Aware that ICTs are taking a greater place in school-home communications, parents feel that schools should continue developing digital tools, but they also need to have strategies in place to help them” (Thivierge, Joyal, Tardif et al., 2019, p.29, free translation)

Although research in this field to date has been scant, it appears that teachers who work in disadvantaged communities tend to use technology without adding a pedagogical value to it (Collin, Guichon & Ntebutse, 2015). Researchers thus fear the *pedagogical divide* that has been noted particularly between private schools (or select programs) and regular classrooms: “Some communities know how to [harness digital technology] for their students, while in others, its use remains largely anecdotal and rather insignificant” (CEFRIQ, 2015, p.17, free translation)

“The term ‘digital native’ has been met with criticism since it was first coined in scientific literature, as there appears to be a dearth of empirical research to evidence its existence and real difference compared to other generations (Boubé, 2011). Also, using age as a means to distinguish one generation from another would be reductive, given that the use of technology varies from one sociocultural or socioeconomic context to the next (Collin & Karsenti, 2013; Margaryan, Littlejohn & Vojt, 2010; Roland, 2015)” (cited in Roy, Gareau & Poellhuber, 2018, p.4, free translation).

In addition, digital skills among pupils and students are not as extensive as previously thought, with the expression “digital natives” increasingly called into question. Even though children generally have no difficulty grasping technology and are good at it as gamers and consumers, not all of them can use it to broaden their knowledge and skills (Yagoubi, 2020).

In reality, this more often than not boils down to a use of technology that is superficial, functional and recreational, and those pursuing an education are becoming increasingly aware of the difference between how they use computers and what is expected. In fact, in an unpublished [survey](#) conducted in 2018 as part of Concordia University’s digital transformation of its library, while 76% of 2,000 respondents said that digital skills will be very important for their careers, only 29% felt they were properly prepared in this area.

In 2017, 934 undergraduate students from six Québec universities took part in a survey, with the vast majority of them admitting they needed to boost their computer, writing and reference

skills as part of their studies. Yet very few university programs include courses to develop these (cross-curricular) competencies, with discipline-based knowledge and competencies being given priority (Peters, Vincent, Gervais et al., 2019).

In 2019, a group of Québec Education students also declared digital education to be a right. This right includes “digital literacy in certain technologies; broadening knowledge on the phenomenon of networks; developing knowledge on the potential and challenges of digital technology; a deeper understanding of access to available information and how content is created; and developing critical thinking” (Communauté en réseau du séminaire-atelier TEN-7000, 2019, free translation).

“Educationally speaking, young people say they learn more about technology and digital tools on their own from the Internet (Google, YouTube, etc.) than at school. Most young people also deplore the lack of more practical courses in all programs. They would like to see during their school hours mix-and-match courses and workshops—for example, on computer programming and coding or game programming. Although there are some initiatives in place, it is difficult to incorporate different youth digital cultures in school programs. This digital dissonance closely mirrors the gap between how young people use digital tools and digital competencies in school” (Yagoubi, 2020, p.137, free translation).

“More specifically, the level of student autonomy and initiative outside the classroom [...] could help them develop new learning styles using digital technology (i.e. developing skills through trial and error, specific collaboration on demand, non-linear exploration and experimentation) that school restrictions are currently preventing from being easily reinvested in the classroom” (Collin, Guichon & Ntebutsé, 2015, p.11, free translation).

In light of all these findings, there is a need for a serious consideration of the initial relationship children have with technology when they are first asked to use it in the classroom.

What the Conseil Concludes

While digital inequality in terms of access will undoubtedly be resolved over time, in the near term it will continue to affect the most at-risk segments of the population. It is therefore important to recognize that **a quality Internet network that is accessible everywhere has become an educational need** we are obliged to meet. Additionally, **without any serious consideration of digital literacy on the part of the school system, inequality in usage will persist** (Collin, 2020). This important consideration should be a cornerstone of education plans, where time spent on digital literacy in the classroom must be well invested for in-depth learning and not just for superficial use. Substituting old means with new ones will not automatically lead to changes in practices nor outcomes. “The OECD has reiterated that technology is indispensable in education, however switching to a digital mode can only be effective when teachers are well trained in its pedagogical use, and when students are shown how to learn with digital tools” (Karsenti & Collin, 2016, free translation).

At the end of the day, we must opt for technology and use it, insofar as it promises new potential for learners and is in constant step with societal change. A **systemic approach** would allow adopting and maintaining good practices. This requires the support of quality research, which, unfortunately, is lagging behind innovation. [Design-Based Implementation Research](#)’s collaborative approach represents one possible way forward: blending research and practice to support iterative decision-making and pedagogical models developed from the outset to be adaptable to different settings (Design Based Implementation Research, 2020), it strengthens the system’s ability to continually improve itself.

3 The New Faces of Literacy: An Overview

“Whether in the workplace or at home, digital technologies have dramatically changed the way we get information, communicate with one another, and manage our daily tasks. Beyond these functional transformations, they have also altered our relationship with the world (connected and geotagged) and with knowledge, both as individuals and as a society: in the past, the validity of information was not questioned—or at least not very much—as it came from sources whose legitimacy was socially recognized and validated by a narrow number of dissemination channels. Today, anyone can publish—or fabricate—new articles, events and opinions, and it is not always possible to ascertain the true source of the information nor the intention of those disseminating it. The Internet is becoming a kind of ‘unfiltered’ echo chamber for an endless number of rumors and other misleading opinions, of which the news provides examples on a daily basis” (Betrancourt, 2016, free translation).

Many concepts have been used in literature, frameworks and various contexts to define digital literacy and its related competencies, and they all cover broadly similar realities. The continual development of digital technologies and the proliferation of settings where they are used have also led to multiple forms of “literacy,” all of which require an **expanded ability to read and write**.

In addition to strictly technological competencies, there is a tendency to cluster competencies related to digital literacy under general terms:

- **Intellectual** or **cognitive**: i.e. analysis and problem solving, creativity and critical thinking;
- **Methodological**: i.e. finding information, communication and the scientific method;
- **Relational** or **socioemotional**: i.e. empathy, support or collaboration relationship.

Literacy in a *digital context* refers to the level of reading and writing needed to be able to function in a digital-based society, while “digital literacy” refers to skills directly related to using digital tools.

The same holds true for the definition used in the Québec Digital Action Plan in Education and in Higher Education (DAP):

“The knowledge and skills that enable a person to use, understand, assess, engage and create in a digital context and, more generally, those that enable him or her to participate in society. Consequently, digital literacy is not limited to technological knowledge. It also includes numerous ethical and social practices in workplaces and learning environments as well as recreational and everyday activities” (MEES 2018c, p.78).

Digital literacy thus encompasses much more than mere technological know-how or functional skills. The latter of course remain foundational and a prerequisite; as they are constantly evolving they also need to be kept up to date.

Reference Frameworks for Digital Literacy: A Summary from UNESCO

Following a summary review of frameworks from 47 countries across all continents, UNESCO has taken expert advice on a proposal for a universally applicable reference framework for digital literacy skills. The areas of competence in the initial project were information and metadata, communication and collaboration, creation of digital content, security as well as problem solving. The experts' input prompted UNESCO to add two new areas of competence: one upstream (how devices and software work), the other downstream (career-related) (Law, Woo, de la Torre, et al., 2018; West, Kraut & Chew, 2019).

These two new recommended areas of competence fall squarely on the shoulders of the education system. First, schools must not take for granted that children entering the system adequately and sufficiently know how today's devices and software work; this indeed can be interpreted as a measure of **basic digital literacy**. Second, at the end of compulsory education, every person should have had the opportunity to acquire the necessary autonomy and skills to further his or her personal and/or professional development.

These general competencies come with a number of issues. **Basic technical competencies**, a vector for socioeconomic integration, are distributed profoundly unevenly. For instance, at the moment private schools have more resources and support at their disposal to promote the development of technical competencies (Collin, Guichon & Ntebutsé, 2015).

The sheer quantity and breadth of available information can lead to overload, making it very difficult to process it all properly (Contu & Pano, 2018). This can, for example, exacerbate the phenomenon of unauthorized borrowing. The large number of pupils and students cutting-and-pasting or using other forms of plagiarism can be explained in part by poor absorption of knowledge and information (Peters, 2015). For this reason, **information competencies** (the ability to search for, assess and process information) are now vital, and should go hand-in-hand with metacognitive (thinking about how we learn and absorb information) and appropriate, democratic, ethical and moral **behavioural competencies**.

Socioemotional competencies such as collaboration, leadership, resilience and communication are now believed to be as important as technical skills and cognitive abilities (Giammarco, Higham & McKean, 2020). Digital communication also demands being able to effectively handle and combine several modes and media. In fact, sounds and images have now joined writing as media in the transmission and production of knowledge. This is considered a **multimedia or communication competency** (Lacelle, Boutin & Lebrun, 2017) or even transliteracy (Yagoubi, 2020).

Lastly, there is a need to develop the **critical thinking competency**, which includes considering the political powers and economic interests underpinning digital technology, social and ecological issues (digital does not always mean eco-friendly), **data protection** (CNIL, 2016) as well as issues related to social media.

Many jurisdictions around the world have updated their curricula to keep in step with these new, emerging faces of literacy. The Conseil has reviewed a selection of these and has identified three major trends.

3.1 Revisited or Updated Curricula

In the curricula reviewed by the Conseil, digital competencies are treated as cross-curricular or cross-disciplinary and are evaluated at different points along the education path.

3.1.1 Cross-curricular Competencies Evaluated at the End of the Education Path

In the curricula reviewed by the Conseil, digital competencies are treated as cross-curricular or cross-disciplinary and are evaluated at different points along the education path.

British Columbia's **digital literacy framework** encompasses six characteristics (research and information literacy; critical thinking, problem solving and decision making; creativity and innovation; digital citizenship; communication and collaboration; and technology operations and concepts) divided across four levels of instruction, and is available to guide teachers from preschool to the end of compulsory education (University of British Columbia, n.d.). Progress is designed to be adaptable, and can be adjusted to the year of instruction for each level, teacher's skill level, and available equipment for students.

Although this framework may not be prescriptive, the competencies cross-curricular and the proposed progress adaptable, digital literacy is evaluated similarly to provincial **assessments** (Grades 10 and 12). These are not based on the content of a particular course; rather literacy and numeracy criteria are applied to all areas of learning (British Columbia Ministry of Education, 2018). These assessments are measured on a competency scale, and can be repeated several times with the best results chosen. To obtain a secondary school diploma, students will thus have to demonstrate the expected level of digital literacy (the first provincial assessments with these changes to the curriculum were slated to be carried out in October 2020).

3.1.2 Cross-curricular Competencies Evaluated Along a Continuum

Two examples of evaluating cross-curricular competencies along a developmental learning continuum were found in Manitoba and in the Northwest Territories.

In Manitoba, digital literacy is [integrated into all programs of study](#) from preschool to the end of secondary school, where it is associated with the [learning through inquiry](#) approach, one of whose objectives is to help students become independent learners (Manitoba Department of Education, n.d.). This program, [Literacy with ICT Across the Curriculum](#), was deconstructed, analyzed and [rebuilt](#) (ibid.) starting in 2013 using new and updated perspectives. A great deal of work was simultaneously invested in demystifying digital literacy and raising awareness of its importance among stakeholders along the education path.

The rollout of a program with ICT literacy is a **collective** effort that rests primarily on the commitment of school administrations (school leaders). The latter in fact must **allocate time for planning and provide opportunity for staff development as well as the necessary resources and technical support**. An online [FAQ](#) (Manitoba Department of Education, n.d.) shows due regard for transparency in and sensitivity to the desired changes, particularly those likely to alter the work of teachers. Many [web-based resources](#) (ibid.) are also available to teaching staff, parents and students.

Manitoba report cards do not contain grades on ICT literacy. Instead, the program lets students set their own learning objectives and self-evaluate. The report card remains an observational tool for teachers, who are asked to formatively [assess](#) the level of literacy attained through ICTs in the various subjects by their students. They do this through observation, portfolios and conversation (giving and getting feedback), continually gathering information on what their students know, are able to do, and are learning to do (based on the latter's set goals).

The Northwest Territories (NWT) has adopted a curriculum similar to that of Manitoba, particularly in the case of evaluations. They have, however, found an original way to define the place of technology in the curriculum and various programs. To dispel any notion that technology is an afterthought, they refer to it as an [infusion](#) (ECE, 2012, p.24).

In an infusion setting, technology is considered as neither supplemental nor complementary to teaching. Nor is it included in a patchwork fashion—it is fully integrated: tools are routinely **used by students** and digital competency is an integral building block of learning.

An Integrative Model

In a way, the concept of infusion used in the NWT curriculum is a good illustration of the model for integrating technology into education commonly referred to as “**TPACK**” (Technological Pedagogical Content Knowledge) (Mishra & Koehler, 2006). “Technological pedagogical content knowledge (TPACK) is a framework to understand and describe the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology-enhanced learning environment” (Wikipédia, 2020e). “The most targeted approach of TPACK consists in analyzing the relationships between content, pedagogy and technology” (Bachy, 2014, free translation).

The infusion model assumes that the content of teacher training covers the component of **knowledge of technology** in the same way as **subject-based content** and **pedagogical knowledge**. Presented as equal and inseparable, these three components are meant to be treated concomitantly and not in separate courses, and the balance between them based on established objectives to introduce more learner-centred activities (ibid., 2014).

3.1.3 Target Competencies Evaluated at Different Times

In New Zealand and Australia, digital competencies in curricula are referred to as “learning areas” particular to technology, and their evaluation occurs at specific points along the education path.

An independent group in New Zealand prepared a [report](#) in 2014 on the development of future skills and digital competencies (21st Century Learning Reference Group, 2014). This report served as a guide to the country’s Ministry of Education in the 2017 revision of the curriculum’s technology learning area. Its content goes beyond functional skills to be more akin to the components found in digital literacy, and are linked to a vision of lifelong learners in a connected world.

In addition, the National Library of New Zealand is an engaged partner in the development of digital literacy and offers many [resources](#) to support school libraries in this field (National Library of New Zealand, n.d.)

The 21st Century Learning Reference Group’s [report](#) underscored some challenges related to the fact that schools provide electronic devices while it advocates the use of personal ones (Bring Your Own Device or [BYOD](#)), ensuring that those who cannot afford them be provided one (notably through foundations or charitable organizations). Experts believe that the use of personal devices encourages learners to take greater responsibility and ownership, namely in adopting safe behaviour (21st Century Learning Reference Group, 2014).

As the Group deemed that digital competencies are essential for moving forward in the 21st century, it recommended for digital literacy to be evaluated. To this end, the New Zealand Qualification Authority is planning to introduce online exams with automated corrections over the next decade. It will also revise assessment practices for learning and make them available online anywhere at any time. The Group noted that **a more accessible, flexible and responsive assessment framework designed to help students take responsibility for their own learning will be a key aspect of future-focused learning**. This framework is

scheduled to be rolled out as soon as possible (21st Century Learning Reference Group, 2014). General assessment guidelines are provided to teachers for each of the expected progress outcomes, based on eight levels from Grade 1 to Grade 13.

The Australian curriculum too includes a learning area devoted to technology. Intended for Kindergarten to Grade 10, it “[...] ensures that all students benefit from learning about and working with traditional, contemporary and emerging technologies that shape the world in which we live.” (Australian Curriculum, n.d.).

Expectations set for the technologies learning area are formulated in two-year cycles from Kindergarten to Grade 10. To keep the system on track, random sample assessments have been taking place every three years since 2005 (Department of Education, Skills and Employment of Australia, 2020), the objective being to test the ability of Grade 6 and Grade 10 students “to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society” (ibid.).

The test combines school and extramural topics, and requires students to put ICT literacy into practice in real settings. Students also complete a questionnaire measuring their **access to digital tools**, their **use of these tools in and out of school**, as well as their **attitudes toward them**.

The test was revised in 2014 and 2017 to align it with changes made to the curriculum. The averages for these two years were comparable (52%-55% of students tested met or exceeded the set standard), but were significantly lower than those for 2005, 2008 and 2011 (62%-66% of students meeting or exceeding the set standard). This could be explained by the fact the test had been revised, with the same things no longer being measured and expectations likely higher.

Making the Grade

Australian researcher Jo Coldwell-Nielson has studied digital literacy among university students. Despite the fact that digital literacy is referenced in the Australian curriculum, she noted that not all those entering university fulfil the criteria and some are even far off the mark. The flexibility schools have regarding expected outcomes may explain this situation, making the development of digital competencies challenging, particularly for university studies. Coldwell-Nielson suggests developing a common vision of digital literacy and target aptitudes and competencies, based on what is being done in schools, and supporting this definition with a systemic model for integrating them into programs (Coldwell-Neilson, 2017).

3.2 Toward a Better Alignment of Curricula, Learning and Evaluation

The examples discussed in the previous section show that to promote a better alignment of the curriculum with learning and its evaluation, it is important to first agree on what constitutes “digital” competencies and arrive at a common understanding for setting benchmarks that specify the minimum expectations for each level of instruction.

In the scenarios presented, the relevant jurisdictions revised one or more parts of their curricula dedicated to technology to propose an updated version that incorporates the development of digital literacy. They also considered the evaluation of so-called digital competencies (*who, what, where, when, why*), and strove to familiarize, inform and support relevant stakeholders with the development of these competencies (which are 21st century skills) by considering the needs and expectations of each, to **elicit action** and ensure collaboration and commitment.

“One of the biggest challenges with respect to 21st century competencies lies in their evaluation. In fact, many current evaluation schemes focus primarily on discipline-based knowledge to the detriment of these competencies. It is also much more difficult to define which skills have been acquired, given their inherent cross-curricular nature. In this context, their evaluation could pose certain hurdles in assessing their acquisition, which involves the judgement of the teacher to do so. The OECD has highlighted, moreover, the need to define a clear and rigorous evaluation framework for these competencies as of their introduction to the school curriculum. This way they will become a priority in the minds of teachers and students alike” (Ministère de l’Éducation et de l’Enseignement supérieur, 2018b, p.8., free translation).

3.2.1 Tools for Learning and Demonstrating Competencies

In evaluating student progress by cumulative grades—as is done today (CSE, 2018)—what must be avoided is letting digital competencies become discrete chunks evaluated separately in each subject. In other words, the Conseil rejects the idea of giving grades for simply having used digital tools. More specifically, the use of a tool should not be evaluated out of context, but as part of a process (i.e. working collaboratively using digital tools) or based on the quality of the outcome achieved (i.e. using proofing tools to submit an error-free text).

Conversely, when no one is formally responsible for the development of digital competencies, nor is their evaluation mandatory, it is quite likely that some students will be deprived of learning that has become fundamental. The trick is being able to ensure support for these competencies without artificially compartmentalizing them. To do so, they need to be natural building blocks of learning in every subject depending on the discipline taught, particularly through the use of everyday digital tools. Throughout this process, evaluation needs to be based on the regular use of these tools in work and social settings.

Yet standard evaluation practices restrict or prohibit the use of technological tools. This way of working—which is inconsistent with the objectives of the Québec Education Program—is detrimental to the

In a learning situation, appropriately using proofing tools can help acquire language proficiency. The proper use of these tools should therefore be part of *writing* skills, and be applied in an evaluation situation.

development of digital competencies. In fact, as students are not allowed to use such tools during an evaluation situation, some do not see the point of teaching or allowing the use of technology at all. Conversely, being insufficiently prepared to write an exam on a computer can lead to lower student performance, particularly among those from disadvantaged communities, who tend to be less familiar with digital tools. A test on a given subject could therefore be turned into an evaluation of digital literacy (Backes & Cowen, 2019; Terada, 2020). These concerns reinforce the need to align learning and evaluation, all the more so in light of Measure 13 of the DAP: develop digital ministry evaluation tools. (MEES, 2018c).

To make the use of technology tools during evaluations socially acceptable, we need to go back to the concept of **competency** “as complex know-how developed through the effective mobilization of a range of internal and external resources in a variety of related situations” (J. Tardif, cited in MEES, 2019a, p.8).

For example, before allowing or prohibiting the use of a calculator, we need to ask what exactly is being evaluated: knowledge of the multiplication table or being able to solve a problem? Basic concepts of a course need to be acquired (otherwise technology is nothing more than a black box), yet technology can boost efficiency of tedious tasks and leave room for the development of more complex competencies.

Allowing everyone to use technology at all times runs the risk of sending the message that acquiring basic knowledge may no longer be needed. On this subject, research has shown that a sensible use of language proofing tools does not undermine learning the basic concepts of language: “students who acquired language proficiency through the use of ICTs had improved as much as others who acquired theirs with pen and paper” (Cabot & Lévesque, 2014, p.137, free translation).

There is a need to find the right balance, then, given that part of intellectual development (as it too needs to be stimulated) remains outside the digital realm. For instance, to properly use proofing tools requires first knowing many grammatical rules and principles with which the tool can prompt the learner to consider when making corrections, although some misgivings are undoubtedly based on underestimating the effort and knowledge needed to analyse what the tool suggests (Ouellet, 2014). Knowing how

to use the software—which does not replace human thinking—is therefore part of the competency (especially in the workplace), and this skill must be taught.

3.2.2 The Importance of Planning Evaluation: The Case of Ontario

Discussions on revamping the Ontario curriculum began in 2010. The first consultations resulted in the release of a report, *Achieving Excellence: A Renewed Vision for Education in Ontario* (Ontario Ministry of Education, 2014), followed by a foundation document entitled *Towards Defining 21st Century Competencies for Ontario* (Ontario Ministry of Education, 2016).

In the fall of 2017, the Ontario Ministry of Education struck a Transformation Steering Committee to establish guidelines on updating the curriculum, harmonizing evaluation practices with the updated curriculum, and the new report card. The form of the latter was slated to be unveiled in September 2018. Following the recommendation of this committee (Transformation Steering Committee, 2018), however, the government delayed rolling out the new report card. The Committee had in fact wanted to **further examine how to best and coherently modify evaluations with the modernized curriculum**. It also wanted to continue—and optimize—consultations with stakeholders (including students) who did not yet have the opportunity to have their say.

«The teacher has ensure that students plan and revise their text on their own or in a group [...] To do so, the use of technology and word processing software including spell check now appears to be a must” (MEES, 2018d). However, “in language arts classes, access to e-tools for writing is practically non-existent” (Grégoire, 2019, p.138, free translation).

3.3 The Case of Québec

In Québec, all levels of instruction already have programs, profiles and reference frameworks in place that could make it easier to integrate the so-called digital competencies that have now taken on a new importance in our digital world.

3.3.1 Current Programs

The Québec Education Program (QEP) (MEES, 2018d) comprises nine cross-curricular competencies that can be applied to digital literacy as defined previously. These competencies are grouped in four categories:

1. **Intellectual:** using information, problem solving, exercising critical judgment, using creativity;
2. **Methodological:** adopting efficient work methods, using information and communications technologies;
3. **Personal and social:** achieving one’s potential, working with others;
4. **Communication-related:** how to communicate effectively and appropriately.

Although the word *digital* is not used, it is abundantly clear that these cross-curricular competencies can dovetail perfectly with the rationale of the reference frameworks that define literacy and digital skills in the curricula discussed in the previous section.

In addition, Media Literacy is one of the QEP's five broad areas of learning. Its educational aim is to "develop students' critical and ethical judgment with respect to media and to give them opportunities to produce media documents that respect individual and collective rights" (MEES, 2018d). Yet school teams agree in saying that "Media Literacy is the most difficult broad area of learning to integrate, the least covered and the one in which students have shown the least improvement" (Landry & Basque, 2015, p.5, free translation).

"The weak anchors in discipline content that link education to Media Literacy and Citizenship and Community Life raise two questions: one on formal instruction delivered in the classroom and the other on the evaluation of learning. It is not the responsibility of any specialty or discipline to develop the Media Literacy broad area of learning; this task belongs to the school as a whole. Given that the link to content within disciplines remains tenuous and the allocation of responsibility vague, it is fair to question how much of the QEP's educational objective in terms of media literacy is being realized in the day-to-day pedagogical practices of teachers" (Landry & Roussel, 2018, p.48, free translation).

In other words, under everyone's responsibility (and thus no-one in particular), with no obligation to evaluate, and in a context where teachers lack the time and support to learn the fundamentals of an approach that basically questions didactic instruction (CSE, 2014), cross-curricular competencies have been virtually forgotten in the implementation of this new education program.

Launched in 2009 and updated five years later, the [ICT Profile For College Students](#) (Réseau des répondantes et répondants TIC, n.d.) is a good example of digital competencies that faculty and colleges can refer to in helping their students master informational, methodological and technological skills, and prepare them for the labour market, university studies and their life as citizens. The ICT Profile includes steps to help guide faculty members incorporate its elements into their courses and an approach for integrating it into programs of study (Dupont, Ouellette & Perreault, 2014, 2015).

The ICT Profile for College Students comprises five basic skills:

1. **Searching for information:** planning and conducting searches, evaluating the quality of the information found, organizing documents to be saved;
2. **Processing information:** identifying relevant elements of information, analyzing it and representing it visually;
3. **Presenting information:** planning presentation of information, carrying out and highlighting the production, and disseminating the information with an eye to variety, efficiency, professionalism and best practices (namely in citing sources, quality of language and mode of communication);
4. **Working in a network:** communicating remotely, sharing content, collaborating on a network;
5. **Using ICTs efficiently and responsibly:** mastering the work environment, learning independently, ensuring the security of digital information, acting in an ethical and civil manner (intellectual property, reputation, etc.).

Despite available resources and expertise developed in colleges, the rollout of the ICT Profile still remains a work in progress. Faculty acceptance is not always a given. Institutional will, as well as time and support, are often lacking for teams to initiate the necessary steps (i.e. analysis, coordination, planning,

upgrading, selection of resources, designing or adapting teaching materials or pedagogical situations, student support) to integrate and implement these profiles in their programs. The college community is overwhelmed, with good reason.

The Bureau de coopération interuniversitaire (BCI) has released a [reference guide](#) on the competencies undergraduate students are expected to acquire by the time they graduate, which includes “making an efficient and critical use of digital resources” (BCI, 2019, free translation). “It is important to stress that this reference guide contains no prescriptive or binding elements for universities. In fact, it is up to each institution to adopt it or be inspired to develop its own” (ibid.) Nonetheless, by formalizing the importance of the student population mastering digital competencies, this framework joins the [Référentiel de compétences informationnelles en enseignement supérieur](#) (Université du Québec, 2016) and could prove valuable in supporting digital integration in university studies, an integration deemed to be very patchy (Collin, Pellerin, Blanchard et al., 2018).

Lastly, some organizations and programs such as [RÉCIT](#), [Cadre21](#) and [APOP](#) offer training services to address a host of needs, while others such as [Vitrine technologie éducation](#), [ProfWeb](#) and [École branchée](#) disseminate the most promising digital teaching practices. In other words, prior to the release of the DAP, education networks in Québec already had available reference frameworks on digital competencies and tools and resources for using digital technology in education. **It is the conditions for their implementation that are lacking.**

3.3.2 The Digital Competency Framework

Québec’s Digital Competency Framework (MEES, 2019a) was made public in April 2019. Presented as one of the key measures of the Digital Action Plan for Education and Higher Education (DAP), the framework is applicable to every level and sector of the Québec education system.

“The aim of this framework is to develop digital competency, which is defined as a set of skills necessary to the confident, critical and creative use of digital technologies to achieve objectives with regard to learning, work, leisure, and inclusion or participation in society. The framework’s dimensions and their respective elements have been designed to permit individuals to become increasingly autonomous in their use of digital technologies in educational or professional contexts as well as in everyday life [...]” (MEES, 2019a, p.7.)

While existing reference frameworks all comprise many digital competencies, the Québec framework includes only one, broken down into 12 dimensions. These dimensions cover what other frameworks and documents on the subject treat as individual competencies. This choice, which may appear confusing, can be partly explained by a desire to avoid the impression among teachers of an overload. The framework has many advantages as well, namely making it easier to evaluate the digital competency overall and in some cases, integrating it into the other competency frameworks.

At it goes beyond a mere interest in tools and offers an overarching view of a digital culture (literacy) and direction, the Digital Competency Framework is remarkable on many levels: It provides a general description of what people are expected to accomplish and do—to varying levels and degrees—in all aspects of their daily lives. At the same time, the examples of its application are presented so succinctly

and out of context that they appear reductive. This was undoubtedly done to lighten the density of the document, yet the anecdotal examples do not clearly show the changes in practice that would be required in some cases.

As considering diverse needs at the outset is more efficient than accommodating them after the fact (CSE, 2017), the dimension of the competency to foster inclusion and address diverse needs too could have been placed at the centre of the wheel.

Unlike other frameworks, whose main objective is to develop a future workforce, the Québec Digital Competency Framework is centred around the concept of citizenship, part of a determination to reduce inequality, and built on foundational aspects and values: expressive and artistic, ethical, critical thinking, technical skills. Its 12 dimensions are concomitant and cannot be ranked in a hierarchical order. Interestingly, the dimensions “Exercising Digital Citizenship In the Digital Age” and “Developing and Mobilizing Technical Skills” are placed at the centre of a [wheel](#) diagramming the framework. In other words, they represent the core, with the other dimensions revolving around them.

However, as it is not prescriptive, **it appears difficult to reconcile this framework with the QEP and post-secondary programs of study and see how the 12 dimensions could be connected to them**, considering the latter will not even be evaluated. The Conseil sees the need here to align the evaluation of learning with a QEP that needs to be updated.

To facilitate the adoption of the Digital Competency Framework, the [Digital Competency Development Continuum](#) (MEES, 2019b) and the [Pedagogical Guide](#) (MEES, 2019c) were released in January 2020, followed by a [template](#) for planning pedagogical activities incorporating the digital competency (MEES, n.d.). These are meant to be standalone planning tools and include ideas of topics to be used in each of the competency’s dimensions. They also provide feedback measures and ways to guide learning in a rationale of support and formative evaluation. They could be used by schools to convey a positive image of the competency and promote the use of technology among pupils and students.

In the Conseil’s view, it would have been helpful for these companion documents to have been clearly presented as **complementary to and released concurrently with the framework itself, as the accounts it received show** that these tools are relatively unknown to teachers. As a recent study reveals, there is work to be done with pedagogical leaders, who could embody them in their organizations and create conditions for the education community to adopt and turn them into field tools (Gravelle, 2020).

[Computational thinking](#) consists of a set of skills, competencies and methods that facilitate problem solving by applying principles drawn from computer science. It “covers problem solving, system design and understanding human behaviours based on basic concepts of computer theory”, i.e. coding or algorithmic processes, and is used notably to understand how artificial intelligence works (Dehler Zufferey, 2018, free translation). “Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing and arithmetic, we should add computational thinking to every child’s analytic ability” (Wing, 2006, in Fishman & Dede, 2016, p.1298.)

3.4 Means of Developing the Digital Competency

The Digital Action Plan for Education and Higher Education (DAP) emphasizes coding as a means to develop the digital competency. Indeed, its second measure is “[i]ncrease the use of coding in education” (MEES, 2018c). This has notably resulted in the Robot 360 pilot project aimed at “targeting the best implementation solutions”. In the DAP, coding was intended to be introduced “in most elementary and secondary public and private schools by the 2020-2021 school year” (ibid., p.27).

A fair amount of research has been devoted to international experiments in robotics and coding in schools, and has revealed three possible ways of implementing them (Moreno-León, Robles & Román-González, 2016). First, some countries base their educational approach on research that anticipates a potential shortage of human resources in the technology field. For these countries, coding appears to be an end unto itself. Others incorporate coding into ICTs or computer science courses. A third group puts more focus on its pedagogical aspects, with this being used as a springboard to learn in other disciplines. It is this last approach that is presented in the DAP.

In Québec, depending on the institution’s program, coding can be offered as an optional course in Secondary Cycle 2. Courses such as this are therefore not part of the list of electives for which the Minister established a program of study (MEES, 2017a).

Computers and introduction to technology are integrated into the QEP through the cross-curricular competency “Uses information and communications technologies,” however it does not include coding, which was taught at the secondary level under the previous curriculum as *Introduction to Computer Science* and *Introduction to Programming Language* (1982).

Currently there are limited data identifying the most effective approaches for teaching and learning so-called 21st century competencies, of which digital competencies are an integral part (Lamb, Maire & Doecke, 2017). Nor is there any agreement on the nature of this learning or the right age for introducing the basics of coding. Yet despite this lack of consensus, many education and computing experts believe that the current technology-driven environment justifies the acquisition of basic digital competencies in compulsory education.

Educational robotics is therefore being increasingly taught in schools across Québec, particularly in private schools. Unlike other jurisdictions that integrate coding into computer science or include it in core courses, Québec instead prefers to “encourage and support the use of coding for educational and didactic purposes in order to help students acquire the learning and competencies prescribed in the Québec Education Program (QEP). Given the interdisciplinary potential of coding, it will be introduced in a cross-curricular manner” (MEES, 2018c, p. 27).

A research paper produced as part of the DAP’s implementation by the Centre de recherche et d’intervention sur la réussite scolaire (CRIRES) shows that “teaching coding promotes the development of intellectual, methodological, personal, and social and communicational cross-curricular competencies. All of them without exception can harness: using information, problem solving, critical thinking, creative thinking, adopting efficient work methods, capitalizing on the use of ICTs and realizing one’s potential” (Barma, 2018, p.117, free translation).

While learning to code can promote the development of computational thinking and cross-curricular competencies—its ultimate objective—it must not be forgotten that these competencies can also be developed through problem-oriented instructional practices and other approaches that put the student at the centre of the action (Turner, 2019).

In addition, while coding or robotics might not be a cure-all, because of their hands-on nature, they can help some students succeed (particularly those with poor writing skills). In this sense, they can democratize learning and become a reason for collaboration and problem solving. They should not, however, be presented as the only way to develop target competencies.



There is no need to make this prescriptive, and the rhetoric of its benefits should be qualified and recontextualized within all possible approaches of developing target competencies and literacy in a digital context. Manitoba's [learning by inquiry](#) method (Manitoba Department of Education, n.d.) provides an alternative, as do collaborative, expressive and creative approaches (Romero, Lille & Patiño, 2017), and [multimedia literacy](#) (Lacelle, Boutin & Lebrun, 2017).

Above all, **care must be taken to avoid suggesting that introducing a computer, robotics or coding course—entrusted to one individual—is the right way to go about developing every dimension of the digital competency.** It is the course designs of all subjects that need to be revisited: a shared responsibility between teaching staff, technopedagogical staff and other professionals such as librarians.

3.5 Lessons Learned and Next Steps

In 2015, France adopted its own digital action plan for education, but due to governance issues and an inadequate initial needs analysis its implementation was seen as disappointing. A vast majority of teachers did not alter their pedagogical methods, despite the introduction of digital tools in their schools. Initial training appears to have been a major damper on the rollout of the plan, and the training offered as part of its implementation was not responsive to needs (Commission de la culture, 2018; Cour des comptes de France, 2019).

Québec could draw some lessons here on the next steps in the rollout of the Digital Action Plan for Education and Higher Education (DAP). The technical determinism of French documents, for instance, is mirrored in some parts of the DAP (i.e. The belief that technology will automatically usher in innovation). This sort of rhetoric wants to illustrate the need—if not the urgency—to teach **via digital technology**, that is, with the help of digital tools. The 2020 health crisis has proven that when needed, technology is bound take on a greater importance in the future. The fact remains, however, that above all, we need to teach—educate, actually—**for a digital world**, and this begs developing skills and making the long-desired paradigm shift in education a reality. To this end, **teacher training needs to be updated and staff on the ground meaningfully supported**, something that was notably lacking in France.

France had counted on rolling out its digital action plan on a voluntary basis, and this deepened the disparities between communities (Cour des comptes de France, 2019). To prevent a similar situation from happening in Québec, the relevant decision-makers need to engage in a robust discussion with actors in the field to define the diverse needs, roles and responsibilities and adopt clear criteria, obligations, targets and standards—including exit profiles—so that measures can flow through to teaching practices. **Prescribing the use of digital tools without first ensuring that each person has the necessary skills, resources, experience and expertise will not foster a successful and judicious use of technology.**

It is therefore essential at the outset to undertake a needs analysis of programs, disciplines, individuals and communities **to support the necessary change in mindset to shift the paradigm from teaching to learning.** In this regard, the rushed and generalized funding of Digital Technology Combos and rollout of pilot robotics projects can appear clumsy and symptomatic of a technological determinism behind the DAP's launch, despite a number of successful experiments on the ground.

As we will see in the next chapter, the view from the ground shows that—like in France—needs in **development, support and assistance** of human resources (i.e. initial and ongoing training, freeing up time, guidance) are not being met. Physical conditions (i.e. available bandwidth, technical support, infrastructure) and some administrative restrictions (primarily for security reasons) do not make the job of teaching any easier. Although the DAP attaches some importance to these elements and earmarks funding for improving conditions on the ground, expectations placed on education communities remain vague and applications of the measures patchy.

Lastly, **for technology to no longer be considered** as peripheral or optional by teachers, but rather **as essential in competency development in a digitally-transformed society**, it makes sense, then, that the technology currently used in the workplace and in society **should not only be used in learning situations, but also fully integrated into the evaluation of the latter.**

What the Conseil Concludes

The French experiment, the QEP's cross-curricular competencies, the ICT Profiles for College Students as well as the information competencies recommended by the BCI all show that a reference framework alone is simply not enough for the optimal development of digital competencies. Without formal requirements and links to the curriculum, without an evaluation of digital literacy, without human, material and financial resources needed to support the implementation of programs, and without any acknowledgement of what this responsibility would mean for teaching workloads, the rollout of this framework will be patchwork at best and inequality will persist.

4 Views from the Ground

To gain a better idea of the front-line acceptance of the Digital Action Plan in Education and Higher Education (DAP) and its different measures, the Conseil consulted its five commissions, each comprised of 15 members representing a level or sector of the Québec education system.

During the fall of 2019, members of the Conseil’s five commissions first completed a brief informal survey to ascertain their familiarity with the DAP, which had been released in April. Only 13% of all members surveyed said they had read it carefully, 42% had never heard of it, while 44% said they had or have some digital responsibilities in their respective organizations.

4.1 Preschool and Elementary School

Members of the Commission on Preschool and Elementary Education believe that there is a digital divide between school and the rest of society. From the child’s perspective, **school is a place where technology does not work**: no devices, old electrical networks, insufficient bandwidth—even a lack of electrical outlets.

Additionally, not all members of the teaching staff feel sufficiently equipped to use different technologies effectively in a pedagogical setting. Some would rather refrain from using them altogether than feel outpaced by their own students. Consequently, they stick to safe administrative or organizational uses like e-mail and interactive whiteboards (IWBs) for slide presentations. It thus appears that **technology is not very readily used by preschoolers and elementary students for learning and developing competencies**.

Ongoing teacher training appears essential here, yet is often superficial without any follow-up and does not effectively meet needs. **Self-directed training** is offered as part of the DAP (notably under Digital Technology Combos), and universities also offer continuing education on the use of digital tools. However, these offers are simply not well known on the ground. Worse, this all becomes one more task in the workload—teachers simply do not have enough time to keep up. The initial training itself too needs to be updated (for example, a course on educational technology offered in one university dates back to 2001).

When it comes to equipment, many criticize the lack of IT support staff in schools. Some schools only receive one half-day visit from a technician every month. Some of the luckier ones have a half-day visit per week. Problems thus pile up, with little time to take preventive action. There are also the periodic nuisances of equipment maintenance and bug management, which fall more often than not to teachers.

If all this was not enough, to simplify the work of technicians and streamline the procurement of equipment, service offers are often limited to products from a single brand or company. Should problems arise with a different technology used in the classroom, service would not be guaranteed.

What the Conseil Concludes

All “hardware”-related issues must be addressed before teachers can make technology available to students for learning and developing their competencies. Prioritizing pedagogy also translates into better technical support and initial and ongoing teacher training, to instill a greater sense of competence in using technology for educational purposes.

4.2 Secondary School

Members of the Commission on Secondary Education feel that the proliferation of technologies and applications as well as their accelerated obsolescence necessitate a pace that is difficult to stay ahead of, and teachers often find themselves lagging behind.

A number of technical problems were also highlighted. For instance, some students do not have access to high-speed Internet at home. Annual subscriptions to expensive resources limit teacher’s choices, in addition to putting a sizeable dent in smaller school budgets. Technical support is woefully inadequate: some school service centres have one technician available to be shared among several schools, with teachers often left to fix technological problems in their classrooms on their own.

Moreover, IT security rules are seen as excessive. What is taught in educational technology courses in university is outright banned by some school service centres. Staff and schools are also limited by the choice of technology teams at their school or school service centre, who have to choose from a list set by the Ministère. In addition, students are now increasingly using technology tools as part of their Individual Education Plans, and these devices do not always match the equipment supported by their school service centre’s IT services.

IT services in fact must comply with very strict security rules, and may forbid applications and resources when their security is deemed too difficult to assure. Commission members do not wish to understate the importance of security—particularly when it comes to sensitive data—however for the sake of striking a better balance between security and pedagogy, they suggest that IT services (technological governance) and educational services (pedagogical governance) work closely together in making technology choices that are better aligned with all needs.

Moreover, due to the lack of time, training offered to teachers prioritizes short formats built around a specific tool or application (in all subjects combined). It might be more productive to focus on what the tool enables students to learn (collaboration, for instance). Back in the classroom, teachers do not always see how they can apply this training to their settings or link it to their courses.

Ultimately, teachers need to be supported over the long term in fulfilling a role that has been greatly transformed, and thinking about how to use technology to engage students is a much harder task than using it as a tool to teach.

In short, members of the Commission on Secondary Education recognize the importance of using digital technology in education; however, as with the members of the Commission on Preschool and Elementary Education, they believe that teachers need to be supported in building a sense of competence and self-efficacy.

4.3 College

The college network already has a reference framework in place for integrating ICT competencies in programs of study (Réseau des répondantes et répondants TIC, n.d.). Although this profile has not gained a foothold in all colleges as of yet, the members of the Commission on College Education and Research deplore its lack of integration to the Digital Competency Framework. This duplication risks being seen as burdensome, particularly for those who work in assessing, updating or revising programs.

The revision of some official documents and mechanisms (educational plans, success plans, evaluations, program updates and revisions, institutional frameworks) would be a good opportunity to think about how to incorporate the dimensions of the digital competency in each program. At the end of this exercise and to ensure coherence and consistency, the roles and responsibilities of those involved need to be clearly defined and led by an overarching vision.

Moreover, opinions are strongly divided on the relevance of digital technology in education, with some members pointing out that, for many of their colleagues, these were still considered to be optional tools.

While divided on what digital technology can bring to teaching, members nevertheless all agreed on the importance of educating **for** a digital world, with ethics and the use of critical judgement in using information—both part of the digital competency—as examples raised.

In some institutions, ICT advisors work for the academic advising department, in others they report to IT services. Creating an ICT committee in each college bringing members of these two departments together would be a good model to follow to articulate an overarching vision that identifies issues and defines roles and responsibilities to ensure a better management of initiatives.

4.4 University

Some universities have included the digital competency found in the Bureau de coopération interuniversitaire's [reference framework](#) (BCI, 2019) in their documents, and are gradually integrating it into the ongoing evaluation and revision of programs of study.

Like reading and writing, digital competency needs to be an integral building block of basic skills. For members of the Commission on University Education and Research, this responsibility for general education is incumbent on the entire education system, and must be both ongoing and adapted to each level of instruction. As for the elements of the digital competency applicable to higher education, these must also take into account the different disciplines.

While students are quite familiar with their communication tools, most of them are not very proficient users of the digital technologies they need. The expected level of digital competence and requirements can vary from one field to the next, with elements of the competency sometimes integrated into subject content. Even then, what is acquired may not always be readily transferable—yet this is precisely what is expected of the digital competency. Updating support in this area is needed. In addition, to ensure a certain amount of continuity, it would make sense to define the entry profiles adapted to each level of instruction.

Universities must also train individuals on the application of digital technology in the workplace. Faculty members must lead students in cracking the code on how this technology can be useful in a discipline and how it can even transform it.

It is also the remit of universities to conduct research, not only on the use of digital technology from a technological standpoint (thus avoiding dependency on industry-led research), but also from a social one, which results in a role of **knowledge transfer of digital competencies** to the workplace and civil society.

Lastly, faced with the twin challenges of obsolescence and data management, universities need to **maintain a critical stance**, be able to debate these issues and resist the lure of the “magic bullets” digital technology offers by understanding **how it works and how it can be used judiciously**.

This array of roles that universities have taken on have transformed the function of faculty. New ways of doing and being that require constant adaption to ever-evolving technology can create additional pressure, and there are not enough human resources available in educational support for faculty to meet the demand. Consequently, supporting faculty—who are not required to train as pedagogues—is one more challenge to consider in facilitating the development of digital competencies.

4.5 Lifelong and Lifewide Learning

Multiple modes of adult education and continuing education—adult general education, vocational training, popular education—are designed for at-risk populations. Given that gaps in literacy and digital literacy influence each other (CSE, 2013), the situations of those who have difficulty reading and writing are simply not going to improve through the use of digital technology.

Those who decide to return to school often have a challenging learning experience. The gulf between past and present is rather wide: the level of digital competence implicitly expected is already significant. **If digital technology is not judiciously used in education, this digital divide will surely widen.** In the past, popular education used to step in to fill such gaps; however, this option has disappeared, as all training is now offered as part of the various certification paths.

Currently, points of service are fewer, with users steered more and more toward the web, as is often the case with francization courses for new immigrants and refugees. Members of the Commission on Adult

Education and Continuing Education are aware that this trend is putting the active citizenship of one segment of the population at risk. It is crucial, then, to establish **accommodation and transition measures.**

In 2019, 19% of Quebecers aged 65 and over claimed that they were “not very computer savvy” (CEFRIO, 2019a). Yet that same year, 39% of Québec adults said they had used the Internet to communicate with the federal, provincial or municipal government in the preceding 12 months. The data thus show that the perception of being able to use online services is strongly correlated with age and the level of education (CEFRIO, 2020)

Distance learning implies rethinking pedagogy in terms of place, time, and even content. The support currently offered is inadequate, and teachers are often left on their own. Rather than develop new training models, traditional instruction is simply being transposed to remote teaching.

Technopedagogical staff and management should thus survey teaching staff on its needs. There is a shortage of technical staff dedicated to pedagogy, particularly to ensure on-site services and resolve problems as they arise. Moreover, it often imposes one way of doing things in the name of digital security. Unwieldy procedures needed to install a tool, application or software also contribute to curbing engagement.

On-the-job training is often done remotely, a method not well suited to people with lower levels of education. Despite efforts by community or literacy groups, many are not finding a response to their training needs. Data show that in some groups (depending on age, level of education or income), the uptake in the use of digital technology is much lower compared to the rest of the student population (CEFRIO, 2019b).

In the vocational sector, funding is allocated at the time of certification, whether the training has been successfully completed or not. This model is not very viable, particularly in a context where ongoing training is offered to businesses. If the education system does not stake its claim in vocational training shifting to a digital mode, others will step in. These “others”, whether private or international, will then set the standards and this could risk sidelining the public education system. It is therefore crucial to **support institutions that offer distance learning, namely to protect the public education system and its accessibility.**

4.6 Concerns across the Board

While some members of the Conseil's commissions appear more reluctant to embrace digital tools than others, the vigorous debate above all shows that not all members are convinced the use of technology alone in the classroom will enhance learning. We cannot fault them for this.

However, all five commissions agree that **there is a need to develop some form of digital competence**. Some members proposed the idea that certain dimensions—**Exercising Digital Citizenship in the Digital Age** and **Ethics and Critical Thinking in Information**—be taught without the use of technology. This view—which is by no means unanimous—may be linked to a negative image of the tools in question. It is also indicative of the need to encourage more research on the conditions for a successful use of technology.

Nonetheless, recognition of a responsibility in developing these elements of the digital competency is a first step toward further dialogue. When the Digital Competency Framework and the supplemental documents to facilitate its implementation are better known on the ground and backed by pedagogical leadership, they can ultimately become useful levers.

Supporting teachers is a running need expressed across the entire education system, up to and including the university level. There is also agreement among the commissions on the lack of technical support staff and that **security imperatives should not come at the expense of pedagogical needs**.

“Technologies in and of themselves do not drive learning. They provide very little value unless the learning task and framework are clearly defined. Instead, the benefits are derived from the collaboration, communication and creativity that these tools support [...] these new tools and the teaching and learning practices that accompany them are projected to result in learning environments that are more personal, participatory, experiential and collaborative” (Scott, 2015a, p.6)

The views captured by the Conseil reveal a major discrepancy between the values conveyed in digital policy and those of players on the ground. Further qualitative research is needed to better document the situation. The Conseil sought to understand this discrepancy, which must be taken into account for a seamless implementation of the Digital Action Plan in Education and Higher Education.

5 Values under Strain

“There is a yawning gap between the ambitious specifications for the use of digital technology [in education] and its desire to emancipate, democratize and encourage freedom of expression on the one hand and conclusive findings on the ground on the other” (Pondaven, 2019, p.25, free translation).

In 2011, the Government of Québec launched an ambitious procurement program of interactive whiteboards (IWBs), with the aim of “modernizing teaching by making it more interactive thanks to this new technology” (Raby, Charron, Tremblay-Wragg et al., 2019, p.65, free translation). Yet research findings did not confirm any new teaching practices as a result (Plantard, 2015).

This initiative is a perfect illustration of the belief that digital technology in and of itself ushers in pedagogical innovations. It also emphasizes the disparity between the rhetoric of the different stakeholders and the actual use of digital technology in educational settings.

5.1 Competing Discourses on Digital Technologies

The way digital technology is viewed influences all stakeholders in the education system. For example, **when we use the term “digital” we often refer to “human” activities and practices carried out using technology rather than the technology itself.**

Be they positive or not, social images, or **representations** (Couture, 2020) can help explain behaviour and actions on the ground. They also provide a rationale for decisions and positions taken. “The way we embrace digital technology (to integrate it into the world of education) is first related to the way we relate to digital tools, by giving them a meaning and a function that can vary depending on the groups using them (as well as on their views and beliefs), but also to the activities and the environment in which they are already working and the goals they are pursuing through them” (Betton & Pondaven, 2019, p.13, free translation). In other words, both those who swear by new technologies and those who condemn their ubiquity may not be apt to hear arguments that run contrary to their way of seeing things.

The most common cliché about technology in education is its inherent ability to promote forms of pedagogical innovation, hence the tendency to view technological breakthroughs as synonymous with pedagogical ones.

“The discourse of innovation is one of the central drivers behind the modern culture of technophilia. The coupling of the concepts of ‘innovation’ and ‘technology’ has made one nearly synonymous with the other, and this assumption structures contemporary debates and policy surrounding the implementation of technologies in schools. Rarely

are pedagogical approaches that utilize technology questioned on their educational merit [...] the infusion of technology as a way to promote innovation is a central component of many teacher evaluation tools and aspects of both national and state level educational reform strategies” (Anderson, 2018, p.43)

From this standpoint, technologies are at the root of a change in the nature of society (in terms of progress or regression) (Fluckiger, 2019). Yet, **in and of themselves technological objects are drivers neither of change nor values**: “what defines the tool is always how it is embraced and used” (Depeursinge & Florey, 2016, p.13, free translation).

For the Conseil, the Digital Action Plan for Education and Higher Education (DAP)’s emphasis on *innovation* and its conflation with technology presents a stumbling block that will not make its rollout any easier. This decree for innovation exerts a counterproductive pressure given the current (and real) use of technologies and the needs expressed by teachers, many of whom see the need to adapt to technology or consolidate their expertise before they can feel ready to innovate. This is something that could possibly begin with simple activities to more efficiently organize daily tasks. We must strive to meet these needs first.

“As for the use of ICTs for learning purposes, [...] 21% of teachers said that they have never planned activities for students using ICTs [...] 49.6% stated that they used them for planning [only] 25% of the time” (Stockless, Villeneuve & Beaupré, 2018, p.117, free translation).

The [Réseau québécois en innovation sociale](#) defines social innovation as “a **new** idea, approach, intervention, service, product, law or type of organization which more adequately and sustainably **meets** a well-defined **social need** than **existing solutions**, a solution which has found **favour** in institutions, organizations and communities and which produces **measurable benefits** for the community and not just for a few individuals. The scope of social innovation is **transformative and systemic**. It is, through its inherent creativity, a break from the status quo” (free translation).

Moreover, the vision of innovation proposed in the DAP is related to the definition found in the Québec Digital Strategy, with its emphasis on production of goods and services and the notion of progress anchored in the collective consciousness. At the same time, this vision of innovation overshadows its **social dimension** (according to which **innovation responds better than the usual solutions to defined needs**).

In short, the enthusiastic rhetoric in public policy (and of players with an economic interest in the digital field) is in stark contrast to what is awkwardly and reductively defined as “teachers resistance,” which has its roots in humanistic values and a negative image of digital technology.

The COVID-19 pandemic has demonstrated that efforts to support the widespread use of digital technology in education are both needed and justified: this technology can provide solutions to problems likely to occur again in the future and meet the demand for flexibility that extends well beyond the crisis. Yet there is no broad consensus in current debates, for example, over innovation and added value, perhaps because these may not be sufficiently supported by values—such as equity—likely to rally the greatest number of education players.

Ensuring that with a **judicious** use of digital technology, our education system can afford all people the opportunity to develop the necessary skills—digital literacy—to avoid being marginalized by changes or adaptations to the new reality may be perhaps the most rallying argument of all.

5.2 Digital Tools: To Use or Not to Use

A good number of studies have highlighted the different social images that teachers have of digital technologies (Ailincal & Gabillon, 2018; Assude, Bessi res, Combrouze et al., 2010; Hew & Brush, 2007; Kouawo, Karsenti & Gervais, 2013). These are often used to justify positions or negative attitudes, and act as “resistance factors.” Teaching staff members who are critical of these technologies see them as:

- **Complicated:** using them properly requires advanced technopedagogical skills as well as a robust offer of initial and ongoing training;
- **Superfluous:** particularly when they do not meet specific pedagogical needs or there is a lack of conviction about their benefits in school settings;
- **Time-consuming:** time is needed to adapt to them, especially when they are imposed by decision-makers and institutional rhetoric that do not always consider reality on the ground;
- **Threatening:** they compromise proven teaching techniques and practices, as well as deeply-entrenched ways of doing things (i.e. The fear of facing empty classrooms because of distance learning);
- **Harmful:** they monopolize attention, make cheating easier, distract in the classroom, etc.

Opinions collected as part of the Conseil’s work discussed in the previous chapters confirm that **very real and concrete barriers justify this negative image of digital tools:** lack of technical support, outdated or unreliable equipment, poor mastery of digital tools and the sense of incompetence that this creates, training or support that does not meet needs.

According to a French exploratory study (Ailincal, Gabillon & Ferriere, 2018), “resistance” to embracing digital technology stems from a feeling of inefficiency coupled with a lack of familiarity with tools and how they work. The authors of the study note that these negative images could influence teachers who are not very confident in their own ability and apprehensive about technology, without necessarily wanting to exclude its use from the classroom.

In addition, teachers can also feel torn between seemingly contradictory expectations. Intuitively, *integrating technology in the classroom* is not compatible with *being more efficient*; this requires an investment in time and a period of adaptation. Of course this is impractical at the outset—indeed at times the opposite might be true, or at least at the beginning (Karsenti, 2013). This state of affairs results in a “measured approach” to technology, where the latter seen as one more tool in the toolkit.

This reluctance could also be explained in part by the “practical” lenses through which imposed changes are considered. With the classroom in mind, **teachers assess the relevance of the innovation or proposed change to solve learning and teaching problems at hand**. They then gauge the amount of time and energy needed for the technology to deliver on its potential and how the solution can be adapted to their student needs (Cuban, 2011). Decision-makers can also determine the value of the proposed changes, in terms of organizational efficacy, efficiency and equity, however this is seen through the prism of the educational system and not from the student’s standpoint, and this may help explain differences in the rhetoric.

Where positive social images can help explain the frequent use of technology in an educational setting, this use may not necessarily be relevant to, or optimal for, learning; **at times, it may even be superficial**. For example, “some teachers continue to use the same course material, but in a digital format made available online for the class or on the student’s device” (CEFRIQ, 2015, free translation). Insufficient as this may be in developing all dimensions of the digital competency, this first step in the use of technology by teachers is by no means wasted. For example, a review of some 15 studies suggest that while giving students computers has limited impact on learning outcomes, it can improve their computer skills as well as other cognitive abilities (Escueta, Quan, Nickow et al., 2017).

External factors or barriers to integrating these tools—including equipment and technical challenges—remain considerable on the ground. Newly-trained teachers appear to adopt a fallback position behind the rules in place, and rely on practices validated by their peers: “these representations, whether preconceived or conceived on the spot, are very important levers in whether or not ICTs will be used in education” (Béziat, 2012, p.56, free translation). In Québec as elsewhere in the world, adopting digital technology for pedagogical purposes still faces a large number of challenges detrimental to its effective integration (Hammami, 2016).

The Sense of Digital Competence among Teachers

More than 9,000 members of the Centrale des syndicats du Québec (CSQ) participated in a survey on the sense of digital competence among teachers, and 97% of them were in favour of using digital tools. Yet despite this overwhelming receptiveness, respondents did not feel they had very good technopedagogical skills. Most of them (70%), however, did say they had received some training, but it was short basic training on the use of digital tools (CSQ, 2018).

A study led by a team of the Canada Research Chair in Technologies in Education in partnership with Fédération du personnel de l'enseignement privé-CSQ reported that 439 respondents believed digital technology was essential. Yet a significant number of them said they needed time (97.9%), training (96.3%), pedagogical support (89.3%) and technical support (74.7%) (Karsenti, 2018b). “[The] current challenge of integrating technology into education lies largely in knowing how to effectively deliver on its educational potential through judicious use. **Ultimately this means addressing teacher training and the time teachers will have to incorporate the skills acquired during this training**” (ibid., p.39, free translation, emphasis ours).

Research involving 1,721 working elementary and secondary school teachers in Québec found that they overwhelmingly see themselves as beginners in technology and they were not familiar with many uses of it, particularly digital learning environments and specialized software. They do feel competent enough to use some technology to create teaching content (i.e. course notes with the Microsoft Office suite) and impart knowledge (i.e. via interactive whiteboards). However, not many of them plan activities around giving students the opportunity to use technology for learning, notably because the tools available to them are not very robust. “For example, they raised issues of connecting to the wireless network, defective equipment, slow and out-of-date computers, being unable to set up or change things in their computer as the latter comes with protective software installed” (Stockless, Villeneuve & Beaupré, 2018, pp.114 and 119, free translation).

The current preoccupation with reducing **screen time** misses the mark. The effects on human health of time spent in front of devices—if real—are not fully known. Research has to take into account not only the time element but also usage in providing guidelines. Screen time is more of an issue related to awareness of healthy lifestyles and responsibility (Forget-Dubois, 2020b).

Pitches in favour of teaching digitally in education—primarily those advocating for teaching **via** digital technology—imply improving teaching through innovation, progress or educational success factors for learners. Yet ICTs should not be considered as **the** solution to traditional school problems such as undisciplined behaviour and lack of motivation among some students (Amadiou & Tricot, 2014). In fact, they may even be a major source of distraction or amplify behavioural issues (Petit, 2018). It is not surprising, then, that some tend to focus on the negative side of technology (Bihouix & Mauvilly, 2016). Digital technology in education is thus also associated with negative images.

Being mindful of social acceptability and receptive to criticism can allow clarifying details and making the necessary adjustments to separate fact from fiction—as in the case of **screen time** (Forget-Dubois, 2020b) or environmental impact (Bordage, 2019). It is also entirely understandable, even legitimate, that the world of education (or at least some disciplines) react to what might appear to be a passing fad or a commodification of education.

Nevertheless, questioning the efficacy of educating *via* digital technology does not relinquish the **responsibility** to teach **for a digital world**. With this in mind, it is important to keep a critical distance from technophilia—recognizing that technology has redrawn the boundaries of literacy—without falling prey to technophobia.



What the Conseil Concludes

Despite measures and budgets allocated to the promotion of digital technology in education, the Digital Action Plan in Education and Higher Education (DAP) remains relatively unknown on the ground. Additionally, a large number of teachers seem to find themselves on the sidelines of this plan, which places considerable emphasis on efficacy, added value and innovation. While these three concepts certainly have a place in such a document, this stress on distinctly commercial-sounding deliverables may shock or offend some who hold a humanistic vision of education first and foremost. Measures intended to quickly procure hardware without any forethought given to pedagogical needs have not helped matters either.

Opinions heard during the Conseil's preparatory work for the present Report show not enough consideration is given to ensuring coherence between the different policies, understanding them, and the ability or willingness on the part of the education world to implement them, **without forgetting teacher training and—perhaps most importantly—working conditions**.

Also missing from the DAP is a **clear vision of which competencies technology can help students develop** and what can be done to facilitate the work of teachers. To this end, the response to basic, concrete needs of the latter should precede expectations as a prescription of innovation.

It would be helpful for all stakeholders to engage in dialogue on the desired direction moving forward. **The transformation of pedagogy should be at the core of any discussion of digital technology**. The needs that technology can help to meet are yet to be defined. **Digital technology can transform disciplines** and should be used to develop subject-related competencies. Additionally, the competencies developed (i.e. analysis and critical thinking) can in turn be leveraged for a more informed and transparent use of the technology.

When the issue of digital technology in the development of learning is brought up, debate tends to veer toward human concerns such as motivation, distraction, plagiarism or behaviour. It is precisely here that class management takes on a meaningful role. In fact, conditions for a successful use of digital devices in the classroom have less to do with the technological tools themselves than with the ability of education communities to fully harness them. Singling out technology would therefore be counter-productive.

One way or another, technology needs in schools must be addressed to ensure teachers can explore and experiment to develop their sense of digital competence, while considering the diverse realities of the different levels of instruction and programs.

5.3 Economic and Social Concerns

“The digital revolution is in many ways incompatible with an ecological transition” (Monnoyer-Smith, 2017, free translation).

Contrary to popular belief, when it comes to addressing environmental problems, the digital response is not the panacea it appears to be. For instance, going “digital” has not made it possible to significantly reduce the amount of paper we use—quite the opposite, in fact. Although we do not necessarily print everything, we do exchange more documents, whose different versions pile up somewhere in cyberspace.

These virtual documents may not exist on paper, but their storage on servers is [energy intensive](#) (Qu’est-ce qu’on fait?!, n.d.). The connections structuring digital space are “written and saved on the hard disks of different Internet players: access providers, search engines, different service platforms, etc. [...] These objects are hosted in a very expensive and physical infrastructure [...] of servers, cables, and even water pumps to cool the circuits. A recent publication of photos of [Google Data Centers](#) has helped increase awareness among users of this reality” (Vitali-Rosati, 2014, free translation).

The production of electronic devices themselves—relying on the extraction of rare and non-renewable metals, using considerable amounts of water and generating a significant amount of toxic by-products which are then released into the environment—is no more eco-friendly than traditional chemical and petroleum industries. This production is then accelerated by marketing strategies that make smartphones and tablets quickly obsolete (Bordage, 2019). To top it all off, the devices are discarded—when they can still be used—and not always properly recycled.

The resulting carbon footprint of devices intended for fast obsolescence is no small matter, and has been increasing exponentially (Bihouix & Mauvilly, 2016; Monnoyer-Smith, 2017). As an example, in the last six years only 10% of electronic waste in Québec would have been processed following regulations as part of a program coordinated by the Association pour le recyclage des produits électroniques. Some hazardous products may also have been exported illegally to developing countries (Guillemette, 2018).

In social terms, poor populations are being exploited in the manufacture of relatively inexpensive products for which staggering amounts of money are being spent on marketing and which provide a significant profit margin for a small number of big companies. This very unethical exploitation of resources takes advantage of the precariousness of poor or war-torn countries. Unsanitary work and life conditions and child labour are two other major sources of concern (Bihouix & Mauvilly, 2016; Monnoyer-Smith, 2017).

Any digital-related education and procurement policies must acknowledge these realities. [Bill 197, An Act to amend the Consumer Protection Act to fight planned obsolescence and assert the right to repair goods](#), prepared by students from Université de Sherbrooke and tabled on April 9, 2019, should have moved the debate forward on the issue of obsolescence. Unfortunately, it was never passed into law.

The BYOD (Bring Your Own Device) Solution

Having first made its appearance in the business sector in 2005, the **BYOD trend** has slowly gained a foothold in the education sector (Dumouchel, 2015). Seen as both eco-friendly—as it reduces the number of devices in circulation—and equitable, the BYOD solution is one example of sidestepping the trap of planned obsolescence. Learners can use devices they already own, and schools refrain from requiring them to buy a specific type of device. However, in the current context of free education as clarified in Bill 12, we must avoid making parents provide THE device needed for school or a program. Regardless, students whose families who cannot afford a device in the first place should be provided one through recycling or reuse organizations. In Québec, for example, the network of **CFER** training centres for business and recycling could step in and help in this regard.

Thus, there could be more investment in support and services related to the use of technology than in the devices themselves, which could also provide ample educational opportunities in ethics and security in the bargain. There are already some proven **examples** of the BYOD solution in Québec (Dionne, 2018, 2019) helping to break down barriers between the recreational and educational use of digital devices.

In post-secondary education, with the exception of specialized programs that require special equipment, it makes little sense to maintain large IT labs when practically all students have their own device (funded, in some cases, by the Loans and Bursaries Program). If we adhere more consistently to the principle of using personal devices (which, it goes without saying, each person must learn to keep secure and up to date), technical staff could be available to provide individual support and services instead of installing, maintaining and updating computers for communal use.

Teachers that have experimented with the BYOD model have, however, pointed out several downsides: distraction, risk of plagiarism, technical problems or disapproval from colleagues (APOP, n.d.). These issues could be mitigated if activities were conceived based on the BYOD solution from the outset rather than adapted after the fact for personal devices. In addition, a collaborative, program-based or departmental-wide approach would be a key enabler, particularly for facilitating learning evaluations.

5.4 Context-Related Influences on the Image of Digital Technology

Although it may be too soon to gauge the full extent of its impact, the disruptions caused by the COVID-19 pandemic may have significantly altered the social image of digital technology in education, a situation that is now putting pressure on education communities to log on.

The school shutdown in the spring of 2020 has led to system-wide adaptations and accelerated changes in teaching practices and experiments that harness digital technology, particularly in distance learning.

Some teachers, however, are less committed than others to using digital tools, with the unprecedented context increasing frustrations and leading to recalcitrant resistance. Conversely, many others were able to develop a sense of digital competence by introducing pedagogical practices and support adapted

to the situation and the student. Similarly, the pandemic has streamlined processes and hastened the execution of effective, less-hierarchical collaborations. In the absence of guidelines and benchmarks, cooperation between players has proven to be a winning governance formula in finding solutions and obtaining innovative results.

As for subject-specific content and evaluation activities, teachers had to revise schedules and lesson plans as well as prioritize and decide what was essential, which resulted in recalibrating the relationship between technology and pedagogical practices. Content deemed superfluous was set aside and some evaluations were replaced by activities more likely to promote sustainable learning. A number of positive things have resulted from this crisis, which could be invested later—early examples of the long-desired transformation of practices.

Innovative uses and new goals pursued through and with technology thus represent an opportunity to re-examine our relationship with it, as the former provides an insight into the relevance of digital technology in education. The time is also right for further technological and social advances—as innovations in health care and artificial intelligence fields have shown. This could represent a first step toward a more sustained transformation of practices and a resetting of strategic priorities in educational institutions.

The COVID-19 pandemic has amplified pre-existing issues vexing the education system, including sociocultural inequalities echoed in the digital world and an uneven integration of digital technology within the education system. Adapting to a new reality during a health crisis may have also caused problems and frustrations that could crystallize resistance. It is now time to take stock, starting with experiences on the ground.

Hopefully, events can help depolarize the current debate pitting technophiles against technophobes, and lay the foundation for a dialogue-based constructive debate with an eye toward sustainable development.

6 Developing and Promoting Information Resources and Services

The Digital Action Plan for Education and Higher Education (DAP) devotes three measures to resources and services: “support for the acquisition and development of digital educational resources” (Measure 11), “develop a provincial platform for digital educational resources” (Measure 15), “provide access to e-books in school libraries and encourage the shift from library to learning commons” (Measure 17). The present chapter will first cover issues related to digital educational resources, then present an overview of the different types of library networks currently in place, a service that could be leveraged across the system to further develop the digital competency.

6.1 Digital Educational Resources

Digital technology is ideal for developing universally accessible educational resources—in other words, it can offer targeted solutions for the specific needs of all individuals, including those with disabilities. For instance, text-to-speech and described video allow the visually impaired to independently access content in a text or film. For the Conseil, it is important that digital educational resources—whether they are open or not—meet the criteria for digital accessibility from the outset rather than be adapted after the fact.

“**Universal access** is the concept of allowing the participation and social inclusion of individuals with functional limitations. It gives all individuals—regardless of their ability—an identical or similar use of services offered to the general public, autonomously and simultaneously” (AlterGo, 2014, free translation).

6.1.1 Open Educational Resources and Software

“Being ‘open’ would certainly not weigh down institutions of higher learning in Québec. Over the past decade or so, the province’s Cégeps and universities have spent nearly \$270 million dollars for proprietary software (about \$190 million) and paid subscriptions to scientific journals (about \$80 million)” (Roy, 2019, free translation).

Open Educational Resources (OERs) are often confused with open access resources. Criteria do exist for defining OERs, however, although they are somewhat limited. For [UNESCO](#), OERs are “teaching, learning or research materials that are in the public domain or released with intellectual property licenses that facilitate the free use, adaptation and distribution of resources” (UNESCO, 2019b). To qualify as open, OERs must include five features, known as the “**Five Rs**”: the permission to retain, reuse, revise, remix and redistribute a resource. An open license gives the individual these permissions, which are free and permanent; licenses are granted through intermediary bodies such as [Creative Commons](#).

Unfamiliarity with OER features makes it difficult to gauge the actual number of their users. A recent survey of 535 teachers in five Québec universities places Québec below the Canadian average (Université de Sherbrooke, Université Laval and Université de Montréal, 2019). This may be explained in part by the smaller number of resources published in French, an issue in the North American context. In addition, some Francophone “open” resource directories such as the [Bibliothèque numérique de l'espace universitaire francophone](#) include resources that would not necessarily meet the “Five R” criteria.

The not-for-profit organization [FACiL](#), whose mandate includes the promotion, use and democratization of open software, has noted a large number of products and services sold by the digital industry raise a red flag about the environment as well as the infringement of freedom and rights. Promoting open educational resources and software can help address these concerns as well as dependency on Big Tech. For FACiL, “being able to tell which software respects user freedoms and which does not” should be an integral part of digital competency, and this could help users “know how to protect themselves and others against malicious features that enable tracking, profiling, surveillance, censorship, etc.” In addition, open formats and software should be a cornerstone of ongoing professional development in digital pedagogy for teachers, education professionals and support staff, “without being steered by a specific provider nor implementation of special technologies” (FACiL, 2018, free translation). The greater the familiarity with how technology works, the less beholden we are to Big Tech.

Fabrique de ressources éducatives libres ([fabriqueREL](#)) is a joint project between Université de Sherbrooke, Université de Montréal and Université Laval (FabriqueREL, n.d.), falls within the DAP, as mandated by the Ministère de l'Éducation et de l'Enseignement supérieur. A needs analysis confirms the widespread ignorance of OER culture, but at the same time shows that there is a keen interest in these kinds of resources, primarily because they can save students money.

FabriqueREL's mission consists in filling the void in Francophone resources in addition to promoting the use of OERs and open culture. Part of the services it offers is also developing digital literacy for teachers and professional expertise of pedagogical staff. For the moment, FabriqueREL is producing and disseminating resources for the higher education community only.

Open resources also bring with them the question of values. While they are often viewed **as contribution to the common good**, the idea of freely sharing resources is not always readily accepted. Consequently, producing OERs should be made attractive for academics, by ensuring, for example, that their production could advance their career. Follow-up tools on the use of OERs would therefore be desirable. Lastly, public ownership could allow the proper recognition and recompense for the work people are producing outside their remunerated positions.

What the Conseil Concludes

OERs have the right potential for disseminating knowledge and enriching education. They can also represent a substantial cost savings for students and the education system alike. As the definition of OERs is not an intuitive one, the FabriqueREL project has laid the foundation for a better understanding and is putting into place means for developing quality OERs in French, scalable for the North American reality. Its support component also provides added value compared to other databases. To further develop OERs, a shift in the culture of producing and promoting educational content is required. Lastly, these resources must be developed with the goal of **universal access** built in (AlterGo, 2014).

6.1.2 The Business of Education Technology

One of the reasons people may be recalcitrant when it comes to technology in education is the fear of schools becoming a pawn of the multinational companies dominating the digital market—**Big Tech** (Wikipédia, 2020d)—and being too reliant on them (i.e. Apple-certified schools, Google Classrooms, Microsoft Education). Moreover, the cost of products—for which an annual subscription is required—can be steep, and investment strategies vary from one school service centre to the next.

Created in 2017, the association Entreprises pour le développement des technologies éducatives au Québec (**EDTEQ**) is supported by the Ministère de l'Éducation et de l'Enseignement supérieur under Measure 28 of the DAP ("stimulate collaboration with Québec businesses to develop educational technologies"). As of September 1, 2020, EDTEQ's website listed 53 Québec-based companies and organizations producing and promoting digital tools for education. The list includes both not-for-profit and for-profit organizations (such as publishing houses) that have formed a partnership for better distribution of their products and services.

"We must make a distinction between digital uses that allow supporting the creativity of the learner and digital uses that turn the learner into a passive consumer (i.e. watching educational videos) or an interactive one (i.e. online quizzes)." (Romero, Lille & Patiño, 2017, p.36, free translation.)

The idea behind EDTEQ is to support local businesses in developing Québec-based educational material and reduce dependency on multinational ones. The association has taken steps to reach out to school administrations as well as RÉCIT advisors to promote the digital resources produced by its members as both **made in Québec** and an alternative to Big Tech's offerings.

For the moment, there are no organizations overseeing that the content of these digital resources is compliant with and relevant to programs. Such an organization could also ensure that digital resources developed meet the criteria of universal access.

In addition, a follow-up is needed to see how educational communities adopt these products. Do they help students develop skills? Do they contribute to the development of the digital competency? Replacing traditional workbooks with **test generating software** (EduTech Wiki de France, 2015)—or any traditional product with a software equivalent—will not adequately answer these questions, all the more so, as this would mean falling into the trap of digital consumerism.

Creating these types of products obviously costs money. Thus, most of these resources are not free; however, some companies are sponsored by organizations. Compliance with user data privacy rules is also expensive for some tools. There would be considerable advantages if these resources were adapted and reused, or at the very least have a one-time user licence instead of a yearly subscription.

For the moment, billing parents for licenses or applications used in the classroom does not appear socially acceptable (unlike buying copybooks).

6.1.3 Responsibility for Development

In the area of digital resources, it is important to make a distinction between digital tools for everyday use (i.e. word processing), those designed for educational purposes (i.e. test generating software, tutorials) and the potential educational use of some technologies (i.e. virtual reality). The responsibility of the system differs for each. Schools have to primarily provide people with the opportunity to properly use the technological tools they will need both as private citizens and as workers. This goes well beyond the mere use of digital educational resources, and involves, for example, the requisite knowledge to make informed choices between proprietary and open software.

Given that the private sector operates on a business model of renewable licenses, entrusting it with the management of basic software and educational resources would mean that the education system will have to assume recurring costs to obtain needed resources. There is a danger here of losing control of the helm, with the system becoming reliant on what business has to offer.

Opting for OERs is another possibility, yet remains limited. There is, however, a third choice: the Government could take over the development of digital educational resources, which would require a system-wide approach and reference framework. The Government would thus assume the cost of **developing open, accessible and free resources that are coherent with programs**.

6.2 Libraries as a Learning Commons

Today, in university degrees for [librarians](#), Library Studies have been renamed “Library and Information Science” (Corporation des bibliothécaires professionnels du Québec, n.d.). As information resource professionals, librarians are specialists who should be regularly enlisted in the development of the digital competency. The overview that follows, however, shows that there is still a long way to go.

6.2.1 School Libraries

First, it should be noted that some school service centres do not have librarians and some schools do not have libraries.

One of the main objectives of the [APSDS](#) is to promote “a shared vision of the role of libraries in schools, the role of its staff and needs of users, as well as the pedagogical use of document resource centres” (free translation).

As students today socialize online and are inundated by information, a shared vision of a school library centred on them is vital. A library needs to be much more than just a space where books gather dust—it needs to become a dynamic place where people go to learn, discuss, engage, produce, explore and collaborate, a *learning commons* that is flexible and accessible at all times, both physically and virtually. It provides support services and a space for engaged and inclusive pedagogy that embodies the value of information competencies. A successful transition from library to learning commons will largely depend on the shared commitment of many players in the school community. The role of librarians in this effort

is to support learners in searching information and developing cross-curricular competencies, particularly those related to harnessing information (gathering it, recognizing its different sources and capitalizing on it) and using critical judgement.

The Association pour la promotion des services documentaires scolaires ([APSDS](#)) is facing a number of issues and challenges in libraries transitioning toward a [learning commons](#) (Canadian Library Association/ Association canadienne des bibliothèques, 2014), for instance staff shortages, lack of cooperation between different players, or the persistence of the traditional notion of the library as a quiet place to read and study.

6.2.2 Public Libraries

Despite what the digital shift might lead us to believe, public libraries have actually seen an increase in the number of visitors (19.6%) over the past decade. According to figures from the [Association des bibliothèques publiques du Québec](#), library services reach more than 95% of the Québec population. Nearly one-third of Quebecers has a library membership through existing initiatives, including e-book loans.

The [UNESCO Public Library Manifesto](#) recognizes 12 missions of the library, including education and literacy, both of which might prove particularly difficult to achieve (UNESCO, 1994). In both the [Alexandria Proclamation on Information Literacy and Lifelong Learning](#) (Fédération Internationale des

Associations et Institutions de Bibliothèques, National Forum on Information Literacy & UNESCO, 2005) and the [Déclaration des bibliothèques québécoises](#) (Table permanente de concertation des bibliothèques québécoises, 2016), public libraries have a key role to play in information proficiency and lifelong learning.

To accomplish this, libraries offer a wide range of outreach programs for the general public, such as family literacy strategies (i.e. promoting reading, parental skills), and work in tandem with different communities to ensure the development of these initiatives, which are part of Québec's Policy On Educational Success (MEES, 2017b).

The same does not hold true, however, for coordinated services intended for school-age children due to a shortage of staff in school libraries with whom to partner. Some school service centres, however, have begun setting up collaborative projects to help with homework.

Public libraries are free and open to the general public outside school hours. They support parents and offer workshops on adult digital literacy. As such, they can assist individuals in developing information and digital skills from birth onwards, and contribute to reducing inequality in disadvantaged communities.

6.2.3 College Libraries

College libraries are increasingly designed to be learning commons. The integration of digital technologies allows access to specialized tools (i.e. 3D printers, virtual reality headsets, robots). Collaborative spaces are also taking on greater importance for working in a team and teaching in active learning classrooms (ALCs).

Under the Fédération des cégeps' Office of Educational Affairs, the Regroupement des bibliothèques collégiales du Québec ([REBICQ](#)) is a community of professionals who share experience and expertise. The REBICQ partnered in developing college education's [ICT Profiles](#). It also took part in the [Diapason](#) project, which it continues to support.

The challenges for college libraries lie mainly in the apportionment of funding earmarked for subscriptions to digital collections based on the number of full-time students (which is not the case for printed works). Consequently, a great disparity has been noted between colleges in terms of accessible digital collections for students.

College libraries offer training on an ad hoc basis during extended hours of service. Group training is also offered, sometimes jointly with faculty members, covering a range of topics from how to search for documents to ethics (i.e. search tools, keywords, evaluating and citing sources, preventing plagiarism). They reach nearly 46,000 students per year, or 38% of full time enrolment.

The Regroupement des bibliothèques collégiales du Québec (REBICQ) provides a link between information or digital competencies and objectives of programs of study to identify areas where library services could step in and provide assistance. Unfortunately, training is often offered in piecemeal fashion—therefore not systematically for all programs.

6.2.4 University Libraries

The role of university libraries in the development of digital competencies is difficult to actualize due to a range of factors: for instance, very broad programs of study or a students who overestimate their competence (with faculty often sharing this view). A [survey](#) conducted in October 2018 among students in the Université du Québec network in fact found that students (and some of the faculty too) are not always proficient when it comes to information.

One of the major challenges identified by the Université du Québec network's [Groupe de travail pour la promotion du développement des compétences informationnelles](#) is arriving at a common language. This is where the Digital Competency Framework may be able to step in and fill the void. The framework could, for example, promote better coordination between institutions from the same level of instruction or from one level to the next, helping to define target objectives and developing a common understanding of information competencies. It could also show how players can contribute to their own development beyond *ad hoc*, one-off actions. Above all, information competencies should be an integral building block in programs of study.

The information competency reference framework adopted by many universities is from the [Association of College and Research Libraries](#), which was last updated in 2015. In an integrated manner, its competencies encompass informed and reflective search techniques, understanding of procedures (through which the information is produced and utilized), using information to generate new knowledge as well as ethically participating in learning communities.

One of the recommendations of a [study](#) carried out in the Université du Québec network on the quality of practices in the development of information competencies among students calls for a paradigm shift in developing these competencies (Bélanger, Boisvert, Lemieux et al., 2017). This shift hinges on the cooperation of all players involved (including librarians), a framework that goes beyond simple document search skills, as well as training that actually reflects needs and is based on an active pedagogy centred around the development of complex competencies.

6.2.5 Highlights

The Québec Digital Reference Framework could be a first step in bringing together and coordinating all levels of instruction to establish a common understanding of target elements and coherence in developing them. This collaboration could be realized by establishing exit profiles based on the development of digital competencies along a continuum—from Kindergarten to a doctorate—and would be ongoing as this continuum is deployed on the ground. The essential aim of the continuum is to ensure coherence between the levels of instruction for a sound development of the digital competency's dimensions in an ever-evolving and democratic society.

As a learning commons, the library is the ideal space for supporting the development of several elements of the digital competency. In fact, through its mandate and the resources it offers, it is a natural fit with the will to educate citizens *for* and *via (with) digital technology*, be it at school or in the community at large.

There is a tension, however, between the traditional view of the library as a place of quiet study and the desire to move toward a learning commons, and both positions need to be respected. Thus, recently renovated libraries can set aside a large percentage of their space for working in silence, but also offer open spaces for working in groups. It would be preferable, though, to have the concept of the library—still very traditional in Québec—move forward to become a more open space akin to the learning commons. Tension can also be found between loyalty to printed books and the acquisition of e-books for library collections. Instead, these should be viewed as complementary, in terms of both collections and spaces for activity.

The Bibliothèque et Archives nationales du Québec (BAnQ) has partnered with education researchers from the [Chaire de recherche en littératie médiatique multimodale](#) and a team from [A Montreal School for All](#) to create educational activities intended for teachers. The aim of the program is to reduce digital inequality among teachers as well as students, and this presumes not only making resources available to them but also supporting people in adopting them (Lacelle, Richard, Martel et al., 2019). BanQ's goal is to share what has been developed to support libraries in their offer of educational services.

Some figures on the number of librarians in education settings: in school service centres, one librarian for every 5,000 students; in colleges, 1.1 librarians per institution (about one for every 3,400 students); in universities, one librarian for every 500 students (800-900 in larger universities) (data taken from a symposium of librarians).

While university and college libraries seem to be investing in digital infrastructure, the same cannot be said for compulsory education, particularly in public elementary schools. The differences in human and material resources between elementary school libraries (which are more numerous by far and reach a greater percentage of the population) and those in post-secondary education are appalling. This is not just a question of available equipment (i.e. 3D printers or virtual reality headsets), but also of the capability to use this equipment for pedagogical purposes.

The Conseil deplores the lack of infrastructure (notably in rural areas), physical space (or room) and poor conditions currently encountered in many schools, the very place where the basic concepts of the digital competency are first learned, not to mention the yawning inequalities observed between public and private schools.

What the Conseil Concludes

Digital technology and the development of information competencies have significantly transformed the role of librarians, valued experts in information science. The library today could easily become a locus for supporting the development of the digital competency's dimensions, provided that institutions have the adapted space and resources needed, and that there are enough librarians, particularly in compulsory schooling.

7 Courses of Action

“[T]he school exists within a given society and at a given time in history, and is influenced by them; in addition, it serves as a factor in their own evolution. It is inspired by a certain human ideal; it is devoted to the development of certain definite qualities; it finds fulfilment in its own special vision of the future. Hence education must at once have its roots in tradition and look ahead toward what is to come—a dual role especially difficult during a period of quickening change in every department of human life.” (Report of the Royal Commission of Inquiry on Education in the Province of Québec, 1964, Volume II)

The Conseil noted from the beginning of this Report that the recommendations it formulated 20 years ago are largely still valid today. The paradigm shift in education desired at that time was supposed to have been facilitated by technology allowing people to get more involved in their learning. We need to acknowledge, however, that change has been uneven and technology is still all too often perceived as simply one more tool in the kit. Yet **digital technology has become much more than a tool, and the influence it wields over our daily lives demands the right kind literacy, including in particular critical thinking.**

It is incumbent on the education system to give all people, at any time in their lives, the opportunity to learn the basic concepts needed to grow in a world that is constantly evolving. Mastering current technological tools and being able to make informed choices about their use are now part of today’s ABCs. For the sake of equity, this new reality entrusts the education system with a novel responsibility: **educating for a digital world.** This does not mean simply replacing school textbooks with the cloud or workbooks with test generating software. Technology is not so much a conduit for teachers to impart knowledge but rather a means to help pupils and students learn and develop their ability to act in a digital world.

Following its work on the role of digital technology in education, the Conseil has formulated several courses of action it deems promising, grouped under three key guidelines. A seamless use of digital tools in education demands first setting into place organizational and material conditions to meet the basic needs discussed in the present Report. It is also crucial to align learning and evaluation practices with programs that specifically refer to elements of the digital competency. Lastly, this much-needed paradigm shift also demands updating programs of study and meeting the need for ongoing teacher training.

7.1 Creating Organizational and Material Conditions for a Seamless Use of Digital Tools

Digital technology has redrawn the boundaries of literacy today. The relevant technology should thus be a building block of education, both as a learning tool and a focus for consideration. Yet based on the preparatory work for the present Report, technical and/or administrative problems and barriers are preventing still too many teachers from using digital tools.

With regard to bandwidth, schools that welcome students from preschool, elementary and secondary levels must also have access to organizations such as the [Réseau d'informations scientifiques du Québec](#).

This is a question, then, of **addressing basic needs** so that the shortage of electric outlets, insufficient bandwidth, slow Internet speeds or lack of reliable material do not become valid arguments against using digital tools in the classroom. Infrastructures must first guarantee a minimum of reliability and stability, so teachers feel adequately comfortable in familiarizing themselves and experimenting with the equipment they are being asked to use. Physical and ergonomic aspects of the infrastructures too need to be reconsidered.

The rhetoric in digital policy should place greater emphasis on the new responsibility incumbent on the system to **develop an institutional vision of the place of digital technology in educational institutions**, and ensure it is led by administrations and shared by all stakeholders. To this end, management is required to create favourable conditions that promote greater collaboration and joint projects.

A review of school success plans, educational projects and other institutional documents would be a timely opportunity to undertake this exercise, during which teaching should be considered as teamwork. There are already successful examples of this in the network, notably the integration of ICT Profiles in some college programs of study.

The responsibility of developing the digital competency should not fall on the shoulders of teachers alone. Technopedagogical staff as well as information and documentation specialists such as librarians have an important seat on this bus, and institutions and/or school service centres should have a sufficient number of them. For each actor to understand the team rationale and what their individual contributions can bring to it, a collective dialogue could help **define all roles and responsibilities from a systemic perspective**, not forgetting the role of pedagogical leaders.

Starting from a clear vision of the target objective, town and municipal resources could be considered in improving digital infrastructures in those communities where they are most lacking. For example, a meshing of public libraries (which already have family literacy initiatives in place) and schools could help instill better attitudes and best practices in terms of digital culture as of the elementary cycles—and possibly as early as preschool.

It is crucial that technical support be relevant, sufficient and sensitive to pedagogical needs. Technicians should be available during school hours and during prep time to troubleshoot technical problems. Teachers also need time to plan meaningful digital activities and integrate them into their practices, and this must be recognized as a task.

While it goes without saying that an institution's IT services need to assure data security, this must not overshadow pedagogical objectives—which are the reason for the services in the first place. Some successful examples of governance show that **close collaboration between IT support services and education services** can help strike a better balance between security and teaching needs. Teachers need to be afforded more autonomy, versatility and flexibility in managing equipment used in the classroom. Including IT support services in the planning of pedagogical projects might help increase the number of people available to support teachers.

Technology has also made communication with parents both more frequent and more challenging. In fact, this has now become possible any time, anywhere. There is thus a need to set clear expectations, especially in the area of the teaching staff's [right to disconnect](#), a workers' right recognized in France (Wikipédia, 2020c). This communication must also not require the use of equipment beyond the reach of some families, nor should planning support strategies forget those who need to consolidate their digital skills.

In its 2017 brief entitled *Toward a School Enriched by All its Students*, the Conseil stated that “future digital educational frameworks are part of a vision of an education inclusive of all and aim for universal access” (CSE, 2017, p. 102).

The availability of digital educational resources in French is also an issue in North America, particularly as most content developed in France is barely adaptable to Québec's educational environment. Moreover, to avoid falling into the trap of consumerism, the relationship between service providers and the needs of the education system must be considered. To reduce reliance on industry choices, the Government could take responsibility for the development of educational resources in French and ensure they meet the standards of inclusive accessibility. Lastly, the use of open software should be actively encouraged.

7.2 Aligning the Curriculum, Learning and Evaluation

Digital technology has become a ubiquitous cultural medium, and we will fail in preparing future generations if we do not integrate it into learning and evaluation. To do so, it is important to establish benchmarks (i.e. official targets, a developmental scale) for each level of instruction, with the objective of people being able to seamlessly use digital tools to learn, communicate and express themselves. This presumes distilling a shared vision of the components of the digital competency so that each level of instruction can work on developing them from a system-wide perspective. In the Conseil's view, an **exit profile in compulsory education should reflect that of a person sufficiently equipped to pursue his or her lifelong learning**, both within and outside traditional institutions.

Fears of cheating are primarily associated with didactic instruction. During an exam, the use of resources is prohibited, which can be difficult to control remotely. Rather than fearing cheating and adopting a punitive stance, it would be best to prevent it in the first place by rethinking teaching and evaluation (i.e., asking questions in the form of problems to be solved, prioritizing the solution process instead of answers).

Nevertheless, current laws and regulations (i.e. The [Education Act](#), [College Education Regulations](#)) do not specify that the digital competency has become fundamental for the entire population. While some policies encourage it, the competency is neither codified in legislative language nor formally expressed in programs. This type of learning thus risks being at the

mercy of the vagaries of each institution's budgets, priorities and challenges (i.e. administrative structures, material conditions, individual support). To avoid resting solely on good intentions, it is important not only to ensure the elements of the digital competency are referenced in curricula and programs of study, but also that they are better aligned with learning and evaluation situations.

While problems in the evaluation of learning (CSE, 2018) are exacerbated in a digital environment, they also predate it, and stem from the fact people now need to be trained to execute complex and sophisticated operations that are more difficult to evaluate than the basic ones now entrusted to machines. Moreover, the shift in the pedagogical mindset required by a competency-based approach is amplified by a changed relationship with knowledge, which goes hand-in-hand with the availability of information and know-how. In other words, developing the digital competency is not as simple as switching formats from paper to digital. In a learning and evaluation situation, the emphasis should be based on logical thinking, the problem-solving approach, and the understanding of algorithms (with coding and educational robotics being two such examples).

Similarly, the technology typically used in our daily lives and the workplace should not only be allowed, but harnessed for learners to develop competencies in a learning situation and demonstrate them in an evaluation situation. Rather than trying to persuade teachers to use technology to give courses, what is needed is strategies to help realize this paradigm shift.

Explicit instruction of the everyday use of technology in each subject, however, would not make it possible to cover and evaluate every dimension of the digital competency. For example, ethics and critical judgement can be ill suited for evaluation in a sitting exam given that answering the question alone does not sufficiently guarantee the individual's social behaviour. What counts is including the ethical aspect of the behaviour, something that is observable in situ. Similarly, how technology is employed to arrive at a result needs to be examined. While these are not easily measurable elements, they are identifiable, with their progress observable over the course of a term or school year. Feedback on this progress could also be given and measured against expectations, without necessarily having to go through a formal evaluation or assigning a grade.

The Québec Education Program (QEP), defined by competencies, already includes most of the cross-curricular competencies that have become vitally important in the 21st century. There is no reason therefore to completely overhaul the entire program. The Conseil does deem, however, that **updating the program is recommended**, as this would allow **including aspects of the digital competency** by clearly referring to the linkage between cross-curricular competencies that reflects the new faces of literacy. It would also be an opportunity to **delete obsolete terms from the program** (i.e. floppy disk, video recorder).

It is important then, that the QEP reflect the fact that moving forward teaching needs to be done not only done *via* and *with* digital technology but also *for* a digital world.

Three conditions have to be met before the integration of digital competencies into the curriculum can occur: **the support of all relevant stakeholders** (including teaching staff and parents) and giving them the chance to adapt to the proposed changes; assuring the **professionalization of teaching**; and lastly, **changes to evaluation practices**, otherwise curricular reforms intended for competency development will fail (Cox & Laferrière, 2019).

At the college and university levels, institutions could **use the evaluation, updating and revision of their programs to incorporate the elements of the Digital Competency Framework**, being mindful to define roles and responsibilities, particularly in the evaluation of the competency in question.

Integrating the digital competency into learning and evaluating it authentically (sensitive to the present and with an eye to the future) and across disciplinary lines requires, however, a change in practice that needs to be considered in teacher training and support for practicing teachers.

Recommendations That Remain Valid Today

Twenty years ago, in its [report](#) on new technologies, the Conseil called for adjustments to teacher training and professional development, namely “to action recommendations and guidelines proposed by the Comité d’orientation de la formation du personnel enseignant (COPFE, 1997). [...] [on] the need for a ‘serious’ initiation to new technologies, an integration of these technologies into course content and training methods and more research into new technologies” (CSE, 2000, pp.129-130, free translation). It also recommended to “impress upon universities to expand their requirements for faculty in charge of teacher training on the integration into pedagogy courses and strategies and the creation of a teaching environment conducive to this. [...] As for initial training, the challenge is formidable for education faculties that need to [...] carry out the pedagogical integration of technologies into their own way of doing and using, and therefore serve as models for future teachers” (ibid.).

7.3 Updating Teacher Training and Meeting Ongoing Professional Development and Support Needs

“If the main goal of twenty-first century education is to build the learning capacity of individuals and support their development into lifelong, active, independent learners, then teachers need to become ‘learning coaches’ – a role very different from that of a traditional classroom teacher.” (Scott, 2015b, p.14.)

The professional identity of teachers is still largely based on the subject they teach, and this needs to be redefined: from now on, teaching should consist more in supporting learning and enabling people to develop skills than imparting knowledge. This work needs to be cross-cutting, multidisciplinary and done in a spirit of collegiality, with multiple players (teaching staff and other professionals) working in tandem to support learners along their learning paths. This represents a major change for teachers, one that needs to be managed accordingly and demands institutions have the pillars to support them.

While literacy has become increasingly complex in a digital world, initial teacher training grants only a marginal importance to digital technology and considers it as one tool among many. Admittedly, universities

Faculties of education should become live laboratories for developing digital pedagogy. To do so, they need to be properly equipped and have ongoing training for the professionals who train teachers.

have begun to introduce support to assist their faculty members in this paradigm shift, and a good number of education professionals do consider the impact of technology on their field of study. Yet the response has been inconsistent and does not guarantee that pre-service teachers currently in training will be able to sufficiently develop their own digital competence. For this to happen, the digital component needs to be referred to from here on as an integral building block of pedagogy and didactics.

Digital technology has transformed disciplines, as the **TPACK** model (Mishra & Koehler, 2006) handily illustrates. Applying this model presupposes first planning which digital tools in the discipline in question need to be mastered. It is also important to consider how a discipline is transformed by technology, and how the latter can be harnessed to develop the competencies expected in the former. Lastly, it demands serious consideration of how skills acquired in a discipline can affect the evolution of the technology itself and its positive use.

The new teaching profession standards would be a good opportunity to revise teacher training programs. It is important to develop teachers' capability to plan learning situations that enlist technology to develop competencies in all disciplines. **Teacher training programs themselves should therefore become models of how integrating technology can serve learning** and must include the digital competency alongside the didactics of the subject, streamlined in a **collaborative** approach. This exercise will also require that those professionals training teachers be in turn supported in their own development.

Current ongoing training and professional development also need to be conceived over the long term. Support and co-development would better respond to individual needs than short and sporadic training. Pedagogical days, which are already busy enough (and in post-secondary education not mandatory) are not the appropriate setting for this type of support, and self-training proposed as part of the DAP does not cover all needs. **The work of teachers should therefore allow room for participating in learning communities.**

Ongoing training to support the development of the digital competency will be crucial in post-secondary education and more specifically in university. In fact, while Cégeps are increasingly considering pedagogy training when recruiting their faculty, and while universities do have different support resources for their faculty on a voluntary basis, **no teacher training is currently required to teach a course in higher education.**

Given the importance distance learning is expected to take on, remote teaching and all it implies—including strategies intended to introduce a human presence in the distance and to support learner engagement—need to be an integral part of teacher training programs. In post-secondary education, ongoing training and support must ensure that these are covered.

Conclusion

“To continue exercising responsible citizenship in the digital era, we need to understand our everyday technologies. This is not about each of us becoming computer engineers, but rather being able to grasp digital issues to understand the M.O. Of a search engine or become aware of the personalized algorithms behind the queries in these search engines.” (Romero, Lille & Patiño, 2017, p.129, free translation.)

Because of the COVID-19 pandemic, the Digital Action Plan for Education and Higher Education (DAP) tabled in 2018 has been somewhat overshadowed by the need to manage an unprecedented crisis. Paradoxically, digital technology is now being used more than ever across all levels and sectors of the education system. Indeed, adjustments made by educational institutions as an emergency response will most certainly have long-lasting effects. As an example, distance learning—primarily offered in post-secondary education and adult education—has overnight become the main channel for children to continue their schooling, not only in Québec but also around the world. For this reason, it is doubly important to concern ourselves with the issues of quality and equity raised in the present Report, particularly with respect to the working conditions of teachers.

Artificial intelligence (AI), which feeds on our personal data, has until now been developed mainly for commercial interests. Education has a crucial role to play so that AI does not remain a “black box” and that we collectively become more competent to help guide both its rollout and that of digital technology, the development of which must be done while respecting diversity.

In a world of rapid change, not all learners have access to the tools they need nor the capability to properly and securely use them. The health crisis has, among other things, laid bare the fact that digital disparities have worsened existing inequalities. At a time when Québec is planning to give each citizen a digital identity, the development of the right literacy appears essential, and this is a responsibility incumbent on the education system.

What COVID-19 has wrought should therefore be considered in updating the DAP to fully encompass the gamut of challenges exposed by the pandemic and meet the needs the present Report may have contributed in highlighting.

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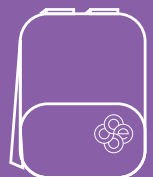
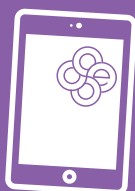
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