COVID-19 as the tipping point for integrating e-assessment in higher education practices

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Abstract
The COVID-19 pandemic provoked an urgency for many educators to integrate digital information and communication technologies in their educational practices. We explored how faculty members tackled the task of adapting their assessment practices during the pandemic to identify what is required to sustain and favour future quality development and implementation of e-assessment in higher education. Employing a qualitative descriptive approach, we conducted semi-structured interviews with thirty-one individuals six months into the COVID-19 pandemic. We identified four major themes in participants’ discourse about the integration of e-assessment during the COVID-19 pandemic: (a) the considerations they had for the potential consequences on students and how they considered this while deciding how to move forward, (b) the preoccupations for the potential for cheating, (c) the importance of pedagogical alignment, and (d) the affordances available to them. While the COVID-19 pandemic highlighted the fact that higher education institutions were not prepared for a pivot to- or greater integration of- e-assessment, it also provided the tipping-point to do so. In other words, it offered an unprecedented opportunity to critically appraise and change assessment practices, this opportunity was also a very challenging balancing act of
INTRODUCTION AND BACKGROUND

The COVID-19 pandemic provoked an urgency for many educators to integrate digital information and communication technologies (ICT) in their educational practices. Many educators and institutions were already using technologies - at varying levels - for teaching. However, the integration of technology to assessment practices was very limited in higher education (HE) and there was little evidence to rely on when making rapid decisions about the pivot to e-assessment (Brady et al., 2019). Six months into the COVID-19 pandemic, we explored how faculty members tackled the task of adapting their assessment practices to the pandemic. The purpose was to identify what is required to sustain and favour future quality development and implementation of e-assessment in HE.

As there are many terms used to refer to the integration of digital ICT to assessment practices, we feel that it is essential to define what term we adopt and why. We wanted to be open to all use of ICTs for assessment purposes and as such we have included assignments being done in Word (for example) and submitted via email, to oral exams done using a web conferencing platform (Alruwais et al., 2018; Appiah & Van Tonder, 2018), including considering the social consequences of assessment, and the alignment within set affordances.

KEYWORDS
assessment, higher education, interview

Practitioner notes

What is already known about this topic
• The advantages of e-assessment include the opportunity for rapid-, even immediate-, feedback.
• The integration of digital information and communication technologies to assessment practices is a source of stress and anxiety for some students.
• The move towards e-assessment increases faculty members’ workload.

What this paper adds
• How cheating, anxiety and workload were considered in the context of a forced and rushed change to e-assessment because of the COVID-19 pandemic.
• The COVID-19 pandemic offered an opportunity to faculty members to take a critical look at their assessment practices and increase their alignment with learning outcomes.
• Faculty members considered the consequences of their decisions on students when making changes to their assessment.

Implications for practice and/or policy
• Moving to e-assessment is an opportunity to align the assessment practice with students’ future professional practice, or in other words it is an opportunity to increase the authenticity of the assessment.
• A better integration of information and communication technology to assessment practices will require to provide educators with skills, time, evidence-informed recommendations, and institutional support among others.
COVID-19 AS A PRECURSOR TO E-ASSESSMENT

Exams done using assessment software. We adopt here the term e-assessment (rather than Digital-Based Assessment, Technology for Assessment, or Technology Enhanced Assessment) as it encompasses all “use of a computer as part of any activity related to the assessment” (Jordan, 2013). In addition, it “includes the entire assessment process, from designing assignments to storing the results with the help of ICT (Joint Information Systems Committee 2007).”

E-assessment has several advantages for students and academic programs. First, the use of e-assessment provides the opportunity for rapid-, even immediate-, feedback (Daly et al., 2010; James, 2016; Rolim & Isaias, 2019; Spector et al., 2016; Whitelock, 2006). The use of technology for assessment offers additional flexibility to educators when providing feedback. For example, there can be a scaffolding of feedback, using different types of feedback or focussing on different content (Cayton-Hodges et al., 2015; Nikou & Economides, 2018, p. 115). This multi-modal and just-in-time approach to feedback can increase students' self-reflection opportunities (Chao et al., 2016; Chen et al., 2013; Cochrane et al., 2013; Crook et al., 2012; Liou et al., 2016; McNeill et al., 2012; Mettiäinen, 2015; Nikou & Economides, 2018, p. 115; Whitelock et al., 2015) and even their motivation (Rolim & Isaias, 2019). By virtue of the data being collected electronically, e-assessment can be used to monitor students' progress and even help with the identification of students with difficulties (Rolim & Isaias, 2019). Despite these advantages and benefits, HE institutions have had a limited uptake of e-assessment (Nikou & Economides, 2018).

The implementation of e-assessment in HE is fraught with challenges, which might explain why HE institutions have shied away from integrating technology to their assessment practices. The integration of technology to assessment practices is resource intensive. While some authors (Rolim & Isaias, 2019) suggest that the move to e-assessment could reduce the workload, many authors have observed an increase in workload, specifically at the development and implementation phases (Blackburn, 2017; Chew et al., 2015; Mettiäinen, 2015; Rodríguez-Gómez et al., 2016; Rolim & Isaias, 2019; Wanner & Palmer, 2015). The technology itself could be a barrier to its integration to assessment practices (Fluck, 2019; Henderson, 2001) because of unreliability issues with the technology sometimes failing. Authors have commented, for example, on the negative consequences that the digital divide may have on low-income students (Camara, 2020; Langenfeld, 2020; Wiley & Buckendahl, 2020). Some institutions opted to provide devices and Internet connection to candidates in need (Evans & Knezevich, 2020). However, this does not ensure the reliability of the internet connection (Katz et al., 2021; Langenfeld, 2020). Other concerns to fair and equitable e-assessment include the difficulty in providing appropriate accommodation for students with disabilities (Camara, 2020). Other barriers include negative attitudes toward e-assessment (Hewson, 2012; Hewson & Charlton, 2019; Hewson et al., 2007) or even low computer literacy skills (Hewson, 2012; Hewson & Charlton, 2019). All of the aforementioned factors or challenges can rightfully hinder the integration of technology to assessment practices and may even threaten the validity of assessment data interpretation by providing construct irrelevant variance (Gaytan & McEwen, 2007). In other words, scores may end up reflecting anxiety or ease with technology as much as, or more than, what educators are attempting to assess per se.

In addition to the aforementioned challenges, integrating technology to assessment practices could have consequences on examinees, programs and society. One prominent consequence is that for many examinees, e-assessment is a source of anxiety (Hewson, 2012; Hewson & Charlton, 2019; Hewson et al., 2007). Another potential consequence, and main argument against e-assessment is that it may provide students ‘opportunities’ to collaborate on what are meant to be assessment of the students' individual knowledge, skills or attitudes. In other words, it is a challenge for educators and institutions to ensure that the correct individuals complete the said assessment (Noguera et al., 2017; Okada et al., 2015,
In addition, it is also challenging to control for potential cheating given the possibilities offered by an un-proctored assessment, (Burgason et al., 2019), using technologies (Bartley, 2005; Gathuri et al., 2014; Gikandi et al., 2011; Hewson et al., 2007; Rowe, 2004) and with the potential access to the World Wide Web (Rogers, 2006). Not surprisingly, a core objection to the implementation of e-assessment relates to the potential for cheating (Akimov & Malin, 2020; Rowe, 2004).

The COVID-19 pandemic precipitated educators to change their assessment practices in order to integrate digital technologies to enable distance assessment. Unfortunately, there were few evidence-informed best practices reported in the literature on which educators and HE institutions could draw from (Ardid et al., 2015; Brady et al., 2019; Farrell & Rushby, 2016; Fonolahi et al., 2014; Hewson, 2012; Meyer et al., 2016; Nikou & Economides, 2018). There are certainly many lessons to be learned from the experiences of educators in HE who overhauled to their assessment practices during the Winter and Spring 2020 semesters. These lessons learned could inform future implementation of e-assessment in HE given the likelihood of maintaining some e-assessment practices post pandemic.

RESEARCH PURPOSE

Thus, our objective was to explore how higher education faculty members managed to integrate e-assessment following the changes precipitated by the COVID-19 pandemic. Given the on-going nature of the pandemic, and high likelihood that some practices will be maintained, we sought to contribute to the growing body of evidence on the integration of technology to assessment practices.

METHODS

Context

The university, where the research was lead, is situated on four different campuses (three of those are situated in the province of Quebec (Canada), and the other is in New Brunswick (Canada)). On March 13th, 2020, the provincial and national government declared state of emergency due to the COVID-19 pandemic. At that time, the province’s education system announced a two-week closure (which was subsequently prolonged), forcing university teachers to change their teaching methods and their assessment. The province of Quebec (Canada) was the most affected province by the pandemic, with 59,845 confirmed cases, of which 7310 people were hospitalized and 5829 died between March 1st and July 27th, 2020 (Institut national d’excellence en santé et en services sociaux [INESSS], 2020). As early as the public health authorities allowed it, and in respect of the sociosanitary measures, the university favoured in-person activities on all the campuses where it was possible. Assessments were to be held on campus as long as the sociosanitary measures could be respected. We started this study (data collection) six months after the beginning of the COVID-19 pandemic. More specifically, data collection occurred at the beginning of the Fall 2020 semester.

Study design

Situated in a constructivist paradigm (Lincoln & Guba, 2016), we conducted semi-structured individual interviews in the context of a qualitative descriptive (QD) study to allow us to explore how faculty members integrated e-assessment during the COVID-19 pandemic. A QD
approach allows us to stay close to participants' points of view (Varpio et al., 2015). It also provides the opportunity to explore a complex and nuanced phenomenon (Sandelowski, 2010). We obtained ethics approval from the research ethics board at the university where the study took place (2020-2642/St-Onge).

**Participant recruitment**

We recruited faculty members, teaching during the Winter 2020 semester who were required to integrate technologies to allow for assessment at a distance. Our recruitment strategy was threefold: (1) Recruitment of participants occurred via a university-wide mail out to all faculty members at the end of Summer 2020 (convenience sampling). In addition, we sent individualized emails to (2) faculty members having requested assistance to the Center for Teaching and Learning during the Winter 2020 semester to adapt their assessment strategies (purposive sampling), and (3) faculty members having done exemplar work in adapting performance-based assessment identified through the teams' collective knowledge and contacts (purposive sampling).

**Data collection procedure**

**Sociodemographic survey**

After consent was obtained, participants were invited to complete a short sociodemographic survey that documented their gender and age, position within the institution (e.g., lecturer, tenure-track professor), years of teaching experience, administrative responsibilities, prior faculty development on assessment and comfort with distance-based teaching and e-assessment practices. We also asked participants to submit their syllabus for their Spring 2020 courses to be able to discuss—more easily—changes made to the assessment practices. We attributed an alphanumeric code to each participant in order to match their interview and sociodemographic data. Only the individual responsible for organizing and carrying out the interviews was aware of participants' identities.

**Semi-structured interview**

Drawing from their expertise and the relevant literature, the research team developed an interview guide with questions to explore factors (e.g., motivations, considerations, barriers and facilitators) that informed changes to participants' assessment practices in the context of the COVID-19 pandemic. An experienced interviewer (KO) conducted all interviews. Interviews were conducted using the university provided web-platform (MS TEAMS) and were audiotaped for transcription purposes. We anonymized data before importing them into our analysis software: NVivo (QSR International Ply Ltd., 2018). We conducted the interviews in French, the native language of the participants. Participant quotes presented in this article were translated by bilingual members of our research team (CSO, TD).

**Data analysis**

We used Braun and Clarke's (2006) six-step approach to thematic analysis to identify, analyse and report patterns (themes) across a data set. This approach seemed reasonable
because it offers clear and concise guidelines around thematic analysis and aligns well with a qualitative descriptive study. A thematic analysis allowed us to stay close to the participants’ words and meanings to limit the level of abstraction, as intended in QD (Varpio et al., 2015). The team was purposefully built to bring together expertise in assessment (CSO, SL, MM), distance-learning (SL), curriculum alignment (TD) and, qualitative methodologies (TD, MM, KO). All steps of the data analysis and interpretation were informed by our collective expertise. The team met regularly to discuss the data collection, analysis and interpretation process and talked through divergent points of view when they occurred to allow for a comprehensive and authentic representation of participants’ experiences.

The analysis started with two team members (CSO & KO) familiarizing themselves with the data (step 1). These team members were responsible for reading two transcripts independently, generating a preliminary set of codes, and then reviewing the other team members' initial codes and coding. They then discussed their coding and create a common preliminary coding tree (step 2). This preliminary coding structure was subsequently vetted by the other team members. CSO and KO continued coding the interviews independently, reviewing each other's coding and meeting at every four to six cumulative interviews to achieve consensus on coding and refining the coding tree. The process was repeated until all interviews had been coded by one team member and the coding had been reviewed by the other team member. Both team members then reviewed the coding for internal consistency. In step 3, both CSO and KO searched for and identified themes that created links across related codes. These themes were discussed and refined through an iterative process between these two team members (step 4). Given our constructivist paradigm, we did not aim to document inter-rater reliability of coding. Rather, our process was underpinned by Braun and Clarke's approach (2006). As such, we adopted their recommended practices to achieve coding reliability (agreement and consensus). For pragmatic reasons, we had two main coders, and then we leveraged the expertise of the team. The perspectives of all team members were negotiated through the process and the coding tree was refine at every stage of the analysis process. Step 5 consisted of defining and naming themes. The same team members refined the themes, and then proposed an initial structure and description of the themes to the other team members for discussion. Through an iterative process of exchanges between all team members, we achieved a consensus about the interpretation of the data. The themes and supporting quotations from participants are presented below (step 6).

RESULTS

Sociodemographic information

Thirty-one individuals participated in this study. The average length of the interviews was of 52 minutes. There were nine women (29%; 22 men), and 21 tenure-track professors (67.7%; 10 lecturers) as summarized in Table 1. Participants averaged 47 years of age, and 14.9 years of teaching experience. About one third of our sample had administrative responsibilities (n = 12, 38.7%). While there were many participants from the Health Professions (Medicine and Nursing made 35.5% of the sample), there was diversity in discipline (see Table 1 for a breakdown of participant per discipline). Thirteen participants (41.9%) reported having followed faculty development training on assessment. Prior to the COVID-19 pandemic participants were more comfortable with distance-teaching than with e-assessment, as illustrated in Table 2.
Use of ICTs in modified assessment practices

Of the participants who modified how their final exam was administered, nine opted for an open-book exam with students sending their completed exam via email while 12 participants used a web platform to administer their exam. Those who abandoned the exam moved to an individual assignment (n = 6), a series of quizzes (n = 1), or a discussion with the faculty member (n = 1). To compensate for not being able to observe and assess trainees in the workplace, three faculty members used the University chosen web conferencing platform to observe their trainees while doing tele-health appointments and subsequently provide them feedback.

Thematic analysis

We identified four major themes in participants’ discourse about the integration of e-assessment in their practices during the COVID-19 pandemic. Firstly, participants were very forthcoming about the considerations they had for the potential consequences on students and how they considered this while deciding how to move forward. Secondly, participants were preoccupied by the potential for cheating and the practices to control cheating.

### Table 1  Number of participants per gender, position and discipline

|                | n   | %       |
|----------------|-----|---------|
| **Gender**     |     |         |
| Female         | 9   | 29%     |
| Male           | 22  | 71%     |
| **Position**   |     |         |
| Tenure track professors | 21  | 67.7%   |
| Lecturers      | 10  | 33.3%   |
| **Discipline** |     |         |
| Health sciences| 13  | 41.9%   |
| Sciences       | 4   | 12.9%   |
| Administration | 3   | 9.7%    |
| Education sciences | 3 | 9.7%    |
| Humanities and social sciences | 3 | 9.7%    |
| Law            | 2   | 6.5%    |
| Engineering    | 2   | 6.5%    |
| Physical activity sciences | 1 | 3.2%    |

*Note: This table shows breakdown of participant per gender, position and discipline.*

### Table 2  Level of comfort with distance teaching and e-assessment

|                | Not comfortable | A little comfortable | Comfortable | Very comfortable | Extremely comfortable |
|----------------|-----------------|----------------------|-------------|------------------|-----------------------|
| **Distance-teaching** | 4 (12.9%) | 4 (12.9%) | 17 (54.8%) | 5 (16.1%) | 1 (3.2%) |
| **E-assessment** | 4 (12.9%) | 11 (35.5%) | 11 (35.5%) | 5 (16.1%) | – |

*Note: This table shows comfort level of the participants with distance teaching and e-assessment, from “Not comfortable” to “Extremely comfortable”.*
Thirdly, while these considerations were important, they did not overshadow or push aside the importance of pedagogical alignment. Lastly, participants reported that their decisions on how to integrate technology to assessment was facilitated or limited by the affordances available to them. Each of these considerations are divided in subthemes presented in the following lines.

Theme—Considering the potential consequences on students

We include here participants' considerations for the general well-being of their students and how the move to e-assessment might affect them. For example, participants shared their consideration for how the pandemic context and the move to e-assessment could be stressful for students. Participants took into consideration the overall workload and personal realities and students' ease with technology. While these considerations played an important part of their decision-making process, participants didn't lose sight of the standards that should be maintained.

Participants were vocal about their consideration for students' stress level during the pandemic when they were making decisions about the assessment to be deployed. More specifically, a participant indicated that there was no interest to 'add an additional layer of anxiety' (P005) in an already stressful situation. Participants modulated their choices given students' other workload and personal realities. As noted by the following participant, the general level of stress lived by students was not conducive to a quality assessment of their knowledge or abilities, and thus choices of assessment strategies and practices had to be considerate of this reality.

“our students were caught up in the epidemic, personal and family management, but they are also healthcare providers in the midst of an epidemic, they are experiencing stress, long hours of work, … we nevertheless sent the message to our teams that we did not expect the same level of depth.” (P023)

Participants were considerate of how students would perceive the changes to the assessment process and thus their satisfaction was 'a major stake' (P011). In other words, participants tried to anticipate the 'level of disappointment from students with regards to the cancelation or changes of the educational activities' (P011) and how that could be considered in their decision-making process.

Participants considered how much students were at ease with the technology or could access the appropriate technology when making changes to their own assessment practices in order to integrate e-assessment. A participant stated using a locally used platform such as 'Moodle' since it was 'what the students knew' (P009). Another participant was cognizant of the fact that not all students 'are at the same technological level, and we assume that since they are young, they are very comfortable and that they are all capable' (P016). For some students, technology was an added source of stress in the context of their assessment.

“That's another collateral effect that was not expected, it is the stress that surrounded this procedure for the students. That is to say (...) I planned a practice period, where they had to submit the practical exam, then proceed to the theoretical one, and it was so traumatic for some to submit their practical exam. I think that it mortgaged the continuation in terms of serenity, one would say.” (P018)
Not all students had the appropriate technology at home; some students were ‘working on their tablets or cell phones’ (P026). One department went so far as to provide computers and internet access to those students in order to allow them to have the appropriate resources to complete the assessment without that prejudice.

These considerations informed the changes our participants made to their assessment. Overall, we see that our participants aimed to build in flexibility in their assessment practices. For example, a collective assignment was transformed in an individual assessment (P025), exam or assignment dates were pushed later (P001, P011, P002, P005, P007, P020, P004, P008), or the correction might have been less stringent (P019).

These considerations for consequences on students translated often in a reduction in the assessment, that is, 13 participants reported cancelling an assessment; four participants indicated cutting content from the final exam. Some participants increased the weight of assessments completed before the COVID-19 pandemic ($n = 6$).

Theme—Tackling potential cheating and practices to control cheating

Unsurprisingly, participants were worried about the potential for cheating brought on by e-assessment in the context of the pandemic. A participant stated that the potential for cheating ‘really is the biggest problem’ (P029). Referring to how the exam usually happens under surveillance, a participant stated that students having access to Internet is ‘accepting an almost complete lack of control’ (P010). In other words, when students can access the Internet during their assessment, there is no limit to the information they can use to complete their assessment.

Some participants struggled with what strategies should be put in place to limit potential cheating. As summarized by this participant, the goal is not to punish the whole for the few that would try to play the system.

“Well, the problem is that it's always the, it's like an organized society where if you put restrictions on managing the minority who are going to break the rules, and at some point, the restrictions become so severe that the honest majority suffers.” (P018)

Several strategies were put in place by participants to limit cheating opportunities. Some strategies articulated around content of the exam, with most often an increase in number of questions. Similarly, a strategy used to control cheating during the assessment is to increase the ratio of questions to time allocated to complete the assessment. Some participants decided to try to limit cheating through the use of multiple versions of the same exam. These multiple versions were created by using “a system that randomized the questions” (P003) or by using different items altogether. In the later context, participants reported being confronted to a problem with ensuring the equivalence between the different exams (when different questions were used).

“So, that’s the idea of the question bank and generating, in fact, questions from this bank, so, to have more questions than what will be displayed in the exam. But the challenge is to have equivalent questions. We don’t want to have a question that reads quickly for one student, and then a question that takes longer for another student, because they will be penalized.” (P020)

Lastly, some participants put in place strategies to detect cheating during the correction of the assessment. These strategies could include having “teaching assistants to identify similar
answers” (P018, P002) and report them to the teachers for guidance on how to score the assessments.

Theme—Ensuring the pedagogical alignment

Participants recognized that ‘there was no perfect solution’ (P005) that is, a solution that would have no impact whatsoever on students and prevent cheating. While a participant indicated seeking to find a balance between “the humanity with which [they] made decisions to reduce barriers for students’ they were quick to state that ‘[these changes] were not for a free pass; we maintained our standards and our direction was clear”. (P029) That is, considerations for students’ well-being didn’t prevent participants from maintaining assessment standards. (P014).

We note that participants carefully considered the alignment between the learning outcomes and the content and tasks in the e-assessment. A participant went so far as to say that ‘having to make changes to the nature of assessment allowed them to make sure that they ‘met the [course] objectives’ (P027). That being said, participants struggled with the comprehensiveness of the content to be covered in the course and thus in the e-assessment. Participants were explicit about ‘prioritising the content [students] should have learned by the end of the course’ (P025, P029, P009), and ‘making sure they have the necessary baggage to be able to intervene ‘in upcoming internships and in the real world’ (P027). Some participants maintained the same assessment strategies -despite the challenges they brought on- because they allowed for an important aspect such as communication skills to be observed and assessed (P023).

Participants actively sought out assessment strategies that aligned with the taxonomy level for which they aimed. In other words, choices reflected their desire to align their assessment choices -and the use of technology- with the cognitive processes that should have been developed throughout the course. For some participants it was quite impossible to use ‘on-line quizzes- where one needs to write things [such as mathematical equations]’ (P005). A participant was explicit that, in his domain, the assessment ‘requires a mathematical language that lends itself poorly through a computer keyboard’ (P007).

Participants also considered the alignment between their assessment choices and students’ future professional practice, as if they wanted to ensure the authenticity of the assessment. This sometimes translated by staying away from recall tasks such as ‘reciting definitions’ (P013). A participant indicated that her goal was to ensure that students had ‘acquired the essential skills to be able to intervene appropriately as [profession]’ (P027) integrating the workforce after this last semester.

Some participants even recognized that the integration of digital technologies is a better reflection of future professional practice than the use of traditional paper-pencil exams. More specifically, a participant reflected on the fact that ‘in real life students will not have situations where they will not be able to take a step back and then go to consult their resources to help them solve a problem’ (P027). As such, providing students with the opportunity to use different information sources to complete their assessment might be ‘closer to their professional reality’ (P027).

Theme—Navigating the opportunities while restricted by the affordances available

Once participants were comfortable that their decisions limited both stress on students and opportunities for cheating while meeting assessment standards, the changes to
e-assessment were informed by the affordances provided to them. Participants took into consideration their own ability and ease with technology, the resources made available to them, and the impact these changes would have on their own workload when making changes to their assessment practices during the COVID-19 pandemic.

Participants’ own ability and ease with technology was an important factor in their integration of technology to e-assessment. While feeling confident with the technology could allow participants more opportunities, a lack in ability greatly limited the integration of technology in their assessment practices. For example, a participant stated that they ‘didn’t know the platform at the tip of their fingers since it had been parachuted on us’ but that now, with some distance and experience, they recognize they could ‘have maintained the oral exam’ (P002) an assessment component that had been eliminated.

Participants stated that the resources and information sources, such as the programs’ guidelines, the university guide on potential e-assessment strategies, or even their colleagues, were sometimes barriers and sometimes facilitators for them while making changes to their assessment practices. For example, participants discussed administrative and human resources that provided concrete support, such as IT support, and those instances the resources were seen as facilitators. The lack of such resources was seen as a barrier to making the changes, where participants felt left on their own device. Participants also discussed the many sources of information, sometimes feeling bombarded or even loss in a sea of information. For example, explicit and just-in-time information was seen as a facilitator by our participants. That is, faculty members appreciated when their programs or departments were forthcoming in providing clear guidelines as to how to integrate technology in their assessment. However, when information came through ‘little by little’ (P001) this was very challenging for participants whom felt they could not move forward with their changes.

Participants considered several elements that could affect their workload when making decisions about changes in the assessment and the integration of digital technologies, such as the group size and how technology could reduce their workload (for example when using multiple choice questions that could be automatically scored). For some participants, their assessment practices were conducive to the integration of technology, for example when being able ‘to use the same question bank’ (P016), when already using an open-book approach or when the ‘content can easily be assessed ‘at a distance’ (P018). Finally, in the context of the COVID-19 pandemic, changes in assessment practices reflected participants’ personal reality. While the timeline to make these changes varied from one participant to the other, the pandemic hit during mid-terms and as such, many participants reported being rushed to make changes to their assessment practices. In other words, changes were affected by the limited time they had to invest in making evidence-informed choices, and implementing high demand changes, as illustrated by this participant:

“I also had some extremely difficult family considerations to deal with, which meant that I was not able to work effectively, quite honestly. That was a big barrier, because we were in crisis ourselves, you know. So it was difficult. We were working nights, evenings. You know, it was really [many] hours … Weekends. It was very difficult. We never did that before. It was really unheard of.” (P011)

**DISCUSSION**

Higher education institutions have a responsibility to train professionals for the future, and now is the time to assess them accordingly. While the COVID-19 pandemic highlighted the fact that educators were collectively not prepared for a pivot to- or greater integration of e-assessment, it also provided the tipping-point to do so. In other words, COVID-19 served
as "the moment of critical mass, the threshold, the boiling point." (Gladwell, 2000) for the integration of digital ICT in assessment. In this study, we tackled how faculty members integrated digital technologies in their assessment practices in the context of the COVID-19 pandemic and we documented the factors that informed their decisions. We were surprised by how faculty members had to carefully weigh several factors, namely their considerations for students' well-being, the practices to be put in place to limit cheating, the alignment between assessment and the educational learning outcomes, all within the constraints of the affordances they had in this difficult situation. In other words, while COVID-19 offered an unprecedented opportunity to critically appraise and change assessment practices, this opportunity was also a very challenging balancing act of considering the social consequences of assessment, the alignment all within set affordances.

While cheating occurs independent of the integration of digital ICT in assessment practices, many authors purport that the integration of digital ICT facilitates cheating (Bartley, 2005; Burgason et al., 2019; Gathuri et al., 2014; Gikandi et al., 2011; Hewson et al., 2007; Noguera et al., 2017; Okada et al., 2015, 2019; Rogers, 2006; Rowe, 2004). When cheating occurs, educators, programs and institutions should not rely on the scores to make decisions about examinees. When cheating is not detected, and those scores are used, the decisions made may be faulty (such as passing a student who did not master the content). As such, cheating is a source of construct irrelevant variance (Downing & Haladyna, 2004; Wise, 2019) and it is a threat to the validity of assessment data interpretation. Faculty members in our study were rightfully concerned with the increased possibility of cheating when integrating technology in their assessments, even more so when the assessment is completed at home. Several strategies were put in place to mitigate, as much as possible, the risk of cheating behaviours: creating different versions of the same exam (random order of questions), time-based testing, asking students to attest that they will not share material or cheat on the exam, having teacher assistants review copies for potential similarities, etc. While there is no holy grail of anti-cheating assessment practices, some authors have proposed recently that an increased authenticity and challenge in e-assessment task may reduce opportunities for cheating (Sotiriadou et al., 2020). This hypothesis, however, requires further testing.

E-assessment, or the use of digital ICT more generally, is known to be a source of stress and anxiety (Hewson, 2012; Hewson & Charlton, 2019; Hewson et al., 2007). Added to the stress normally associated with digital ICT and e-assessment, was the context of the COVID-19 pandemic which faculty members and students alike needed to navigate. As such, it is not surprising that participants had their students' well-being at heart in the context of the COVID-19 pandemic and throughout their pivot towards e-assessment. While these considerations reflect basic human decency, they are akin to the validity evidence of consequences put forward by Messick (1995a, 1995b). He was the first to make explicit that a validation process should integrate consideration for the consequences of assessment on assesses, and the interpretation of the assessment data. While he was greatly critiqued (eg, Cizek et al., 2008, 2010; Shepard, 1997), our participants seem to intuitively align with his view that consequences of assessment should be given careful considerations. These considerations for students' well-being were not without challenge or added burden to the faculty members.

As observed by many authors (Blackburn, 2017; Chew et al., 2015; Mettiäinen, 2015; Rodríguez-Gómez et al., 2016; Wanner & Palmer, 2015), the pivot to e-assessment increases the workload for faculty members at the stages of development and implementation. Our data aligns with these findings, even more so in the context of the COVID-19 pandemic. For example, changes were constrained namely by the documentary resources available to inform participants' choices, the human resources to support them making the changes, their personal technological abilities and competences to create and try something new, and their personal time and space to be able to push themselves further. All these
changes to assessment practices occurred in a very short time span and were bound by our participants' affordances. In other words, our participants did the best they could with what was available to them during that time span. In a normal context, given these systemic challenges, there is often a need for institutions to be active partners in the implementation of e-assessment (Brady et al., 2019; Rolim & Isaias, 2019), which can translate, for example, in quality faculty development opportunities (Brady et al., 2019; Isaias & Issa, 2013).

Although changes to assessment were precipitated by the COVID-19 pandemic, our data suggest that they were unanticipated positive consequences and that the changes were made with great concern for quality assessment data collection and the validity of score interpretation. Specifically, our participants were very cognizant of the alignment between the curriculum and assessment when making changes to their assessment practices. That is, our participants were explicit about their concerns for content representativeness and task appropriateness on the assessment when making decisions about how to integrate digital technologies to their assessment practices. For example, participants were explicit about moving to assessment that aligns with students' future professional practice, as it has been a driving factor towards more e-assessment in the literature (Gil-Jaurena & Softic, 2016; James, 2016). This is an unanticipated positive consequence of the change to e-assessment, and to our knowledge, it had never been documented before. Since many participants were familiar with assessment (41.9% had participated in faculty development on assessment), it is not surprising that they were concerned about the alignment between the curriculum and assessment. While the change to e-assessment practices added work for faculty members (as it is reported in the literature for the development and implementation stages) (Blackburn, 2017; Chew et al., 2015; Mettiäinen, 2015; Rodríguez-Gómez et al., 2016; Wanner & Palmer, 2015), having to make these changes allowed them to take a critical look at their assessment practices and affords them the opportunity to make changes that could increase the validity. While never explicitly referring to modern conceptualizations of validity, these preoccupations align with the evidence of content and process as purported in the Standards for Educational and Psychological Testing (American Educational Research Association et al., 2014).

This study has limitations. Our data collection occurred the semester following the provincial and national declared state of emergency due to the COVID-19 pandemic. The data were collected at the beginning of the Fall semester, and some faculty members might have still been in adaptation mode anticipating the upcoming second wave. This timing did not allow our participants to have substantial distance with their experience of pivoting to e-assessment, nor did it allow them to have tested out several strategies and maybe gain confidence and ability managing e-assessment. Notwithstanding these limitations, our choice was purposeful; it was meant to limit recall bias and it was also meant to provide a description of the experiences closer to when these changes were made in a rushed manner. Also, our study was conducted in one institution, that, as illustrated above, was different on some aspect namely favouring in-person learning as much as possible. This may have influenced our results. Future studies should investigate how the experiences, perceptions and practices have changed, further down the line, that is, more than one year in the COVID-19 pandemic. Finally, we included all forms of e-assessment without differentiation. Motivations, facilitators and barriers might vary according to the e-assessment put in place. Future studies should investigate this further.

CONCLUSION/TAKE HOME MESSAGE

While we could have expected that participants' discourse focused on the affordances when having to abruptly integrate technology to their assessment practices to conduct distance
assessment because of the COVID-19 pandemic, we were surprised by how many other factors were considered in their decision process. Faculty members were greatly considerate of the consequences of their decisions on students when making changes to their assessment. For example, they tried to implement strategies that would not contribute to increase student's anxiety, while managing their own workload and the opportunities for cheating. In addition, we observed that the COVID-19 pandemic offered an opportunity to faculty members to take a critical look at their assessment practices and increase their alignment with learning outcomes. Thus, moving forward with the integration of technology to assessment practices, our data clearly show that we do not need to convince educators of the importance of quality practices, but we have to provide them with the appropriate affordances such as skills, time, evidence-informed recommendations, and institutional support.

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CONFLICTS OF INTEREST
The authors declare no conflicts of interest. The views expressed herein are those of the authors and do not necessarily reflect those of the Vice Rectorat Éducation, Université de Sherbrooke.

DATA AVAILABILITY STATEMENT
To protect participants' privacy, the dataset used in this study is not available openly.

ETHICS STATEMENT
This project has been approved by our local Institutional Review Board (Comité d’éthique de la recherche (CÉR)—Éducation et sciences sociales, Université de Sherbrooke), 2020-2642/St-Onge.

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**APPENDIX**

**INTERVIEW GUIDE USED TO CONDUCT SEMI-STRUCTURED INTERVIEWS WITH PARTICIPANTS**

**Ice breaker**

What did you know about e-assessment before the COVID-19 pandemic?

**Changes made to the assessment practices**

For the course X, your syllabus presents the following assessment practices (…)

What changes did you make to the assessment practices (summarize)?

• changes to the process
• changes to the content

**Motivations/Considerations**

What sources have informed these changes?

• *Potential prompts:* Literature, consultation with peers or experts, program orientation or guidelines

What motivations/considerations have informed these changes?

• *Potential prompts:* planned duration of the assessment, potential cheating, feasibility, time available, principles of justice/equity, number of students, web-platform accessibility, context/individual involved in the assessment, accreditation agencies requirements, level of the learners, ease with technology, alignment with learning objectives, nature of the learning

**Barriers and facilitators**

What barriers and facilitators did you encounter?

*Potential prompts:* infrastructure support, knowledge or previous experience, structural barriers, need to take rapid decisions, technological challenges, pedagogical design of the course

**Reflection**
With hindsight, what would you have done differently?

Closing
What changes do you intend to maintain? Why?
Is there anything else that you would like to share?