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LOOKING BACK TO SEE AHEAD: AN ANALYSIS OF K-12 DISTANCE, ONLINE, AND REMOTE LEARNING DURING THE PANDEMIC

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ABSTRACT

While the use of distance and online learning had been used for over a century in the K-12 setting (including in isolated ways during previous pandemics and natural disasters), the complete worldwide closure of schools focused attention on the use of distance and online tools and content to provide continuity of learning in a remote context. The way in which both practitioners and scholars make sense of what has occurred over the past 18 months, and what is likely to continue into the future, will impact both regular schooling and how we prepare for future crisis. This article explores this pandemic pedagogy, with a goal of situating the events since March 2020 within the broader field and providing guidance on a path forward.

Keywords: K-12 distance learning; K-12 online learning; emergency remote learning; remote learning.

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1 INTRODUCTION

The 2020-21 school year was just beginning to wind down when I delivered a keynote at the *Skola och utbildning utanför 50-skyltarna. Vad har hänt i omvärlden under pandemin. Vägval, effekter och diskussioner i vår omvärld* research symposium hosted by *Aktuell Skolpolitik*. At this stage of the pandemic, the world had witnessed the closed of schools worldwide in the Spring of 2020, as well as the rapid transition to the use of distance and online tools and content that followed. Scholars were also in a position to assess the actions taken by school authorities to prepare to open schools in the Fall of 2020. While the school year was still in progress, it was in the waning most in most jurisdictions that followed the Fall to Spring school calendar, and scholars were just starting to examine how the 2020-21 school year had unfolded.

This article provides an overview of the main concepts contained in that keynote presentation, along with new ideas that have become apparent as school authorities begin their second complete school year during this pandemic. Many of these ideas have been presented in isolated and disconnected fashions in a series of previous publications (see Barbour et al., 2020a; Barbour & LaBonte, 2020; Nagle et al., 2020a; Nagle et al., 2020b; Nagle et al., 2021).[1] In this combined and expanded effort, I begin by providing some background and history on the use of distance and online learning – both during regular times and in crisis situations. I continue by outlining the distinction between online learning and emergency remote learning, and how the transition that occurred during the Spring 2020 was an example of the latter. Next, I provide a framework to situate the events of the Spring as the first of four phases that school authorities engaged in towards the goal of a 'new normal' in the delivery of K-12 education. This framework also sets the stage for a discussion of the 2020-21 school year, including the various learning models that occurred and the impact those models had on the local epidemiology of the pandemic. I conclude with some speculation, as well as a warning, for the coming 2021-22 school year.

2 K-12 DISTANCE AND ONLINE LEARNING IN THE CONTEXT OF DISASTERS

The concept of providing K-12 schooling at a distance or in an online format is not a new concept. In fact, it is a concept that has been around for well over a century. Saettler (2004) indicated that the first documented use of distance learning in the K-12 context in the United States was the use of instructional film around 1910. The following decade saw documented uses of correspondence education and educational radio being used in Midwestern state like Nebraska, Ohio, and Wisconsin (Bianchi, 2002; Broady et al., 1931; Saettler, 2004). These initiatives

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were not limited to the United States. There were documented uses of correspondence education and educational radio in places like Australia, Canada and New Zealand (Dunae, 2006; Moore & Kearsley, 1996; Rumble, 1989; Stacey & Visser, 2005; Stevens, 1994). In fact, Barbour (2018) argued that the development of K-12 distance education opportunities evolved from correspondence education to "various media (e.g., radio, instructional television, telematics, videoconferencing, etc.) to online learning, and then blended learning" in many international jurisdictions (p. 23). Throughout the early 2000s, many scholars documented the K-12 online and blended learning capacity of nations all around the world (e.g., Bacsich et al., 2012a; Bacsich et al., 2012b; Barbour et al., 2011a; Barbour et al., 2011b; Powell & Patrick, 2006).

While these historical developments have been focused on how K-12 distance and online learning could be used to provide opportunities for students that for a variety of reasons were unable to gain equitable access to learning in the face-to-face classroom, this isn't the only way in which we have seen distance and online learning used in the K-12 environment. Many scholars have argued over the past decade that K-12 distance and online learning could be used as an option to maintain instructional time during short term school closures such as snow days (Haugen, 2015; Hua et al., 2017; Milman, 2014; Morones, 2014; Swetlik et al., 2015). In fact, only six weeks prior to the beginning of the current pandemic, the schools in the capital of my home province of Newfoundland and Labrador in Canada were closed for 10 days after experiencing a record-setting 76.2 centimeters of snow in one day (CBC News, 2020a; Erdman, 2020). Unfortunately, schools in the area were not equipped to provide K-12 online learning to ensure continuity of learning, and the students lost two weeks of school.

The use of K-12 distance and online learning has also been used to maintain continuity of learning in other forms of natural disaster. For example, following major earthquakes from two different faults in the span of six months in the Christchurch region of New Zealand, Mackey et al. (2012) described how "the immediate post-earthquake challenges of redesigning courses using different blends of face-to-face and online activities to meet the needs of on-campus, regional campus, and distance pre-service teacher education students" (p. 122). Similarly, Schwartz et al. (2020) described that distance and online learning could be used as "a way to continue instruction in emergencies" following the 2017 hurricane season in the United States (p. 2). However, it would be wrong to give the reader the impression that this concept was a new idea born out of a digitally connected world that is experiencing more significant climate-induced disasters.

In fact, even the use of distance learning to address issues of instructional continuity during a pandemic is not a new concept. For example, in an article for the online news site *The 74*, McCracken (2020) described how the telephone – a technology that was only 40 years old at the time – was being used to provide access to instruction during the Spanish flu pandemic for high school students in Long Beach. McCracken wrote that, "the fact that California students were using it as an

educational device was so novel that it made the papers" (para. 2). Another example of distance education being used to provide continuity of learning for K-12 students was during the 1948 polio epidemic in New Zealand. The epidemic was responsible for closing all of that country's schools (German, 2020). At the time the Correspondence School provided traditional correspondence education by sending lesson packages to every household, and the Government also used educational radio to broadcast lessons on public stations.

More recently, online learning helped facilitate continued access to instruction in Hong Kong in 2003 when schools had to close due to the SARS outbreak (Alpert, 2011). Following this experience, K-12 schools began to better plan for a more formal use of online learning for future school disruptions, which was evident during the H1N1 outbreak in Hong Kong in 2008. Latchem and Jung (2009) described how online learning allowed approximately 560,000 K-12 students to continue learning during that pandemic-induced school closure. In fact, the use of online learning to address continuity of learning is so pervasive in some Asian countries that it has simply become a part of the standard learning calendar.

> …In Singapore online and blended learning was so pervasive that teaching in online and virtual environments was a required course in their teacher education programs and schools are annually closed for week-long periods to prepare the K-12 system for pandemic or natural disaster forced closures (Barbour, 2010, p. 310).

While these examples come from what are essentially city-states in Asia, these aren't the only illustrations available.

When Boliva experienced high levels of absenteeism during their own H1N1 influenza pandemic in 2009, a number of private schools developed their own virtual classrooms and trained teachers on how to teach in that environment following (Barbour et al., 2011a). The report specifically noted that this trend was not carried over to the public school system, as it had in places like Hong Kong and Singapore. Similarly, the SARS outbreak in 2003 also closed four schools in Canada's largest jurisdiction – the Toronto District School Board. Interestingly, reports at the time suggested that the "district didn't implement a full-scale virtual-learning program. But they did gather online learning links from the Canadian Ministry of Education on the district's Web site for access to material supplementing students' classwork" (Borja, 2003, para. 15). The superintendent was also quoted as saying, "we had homework provisions [online] for these kids…. They need to keep up with their classwork and keep engaged" (para. 17). In her reporting on the impact of the pandemic on K-12 schools, Borja also used examples from mainland China and Japan as a part of her argument that American schools needed to ensure that the use of distance and online tools for continuity of learning was included in their crisis planning.

Unfortunately, these lessons were often short lived. For example, following the SARS outbreak in Canada, Christensen and Painter (2004) summarized an editorial in the Canadian Medical Association Journal (2003) by stating:

> whether the right structure, both medical and political, was in place for fighting epidemics like SARS. It questions whether the local and provincial health authorities had the training and the resources they needed and the proper surveillance and reporting system in place (p. 37).

One could replace the word 'medical' with 'educational,' 'health authorities' with 'school authorities,' and 'surveillance and reporting' with 'teaching and learning;' and the sentiment would continue to be accurate.

> Whether the right structure, both *educational* and political, was in place for fighting epidemics like SARS. It questions whether the local and provincial *school authorities* had the training and the resources they needed and the proper *teaching and learning system* in place.

For example, in their report *Learning from SARS: Renewal of Public Health in Canada*, the only time the word 'school' appears is to describe the schools that were closed due to the outbreak, and then the role of closing schools to contain a future outbreak (Health Canada, 2003). There was no discussion at all to how continuity of learning could be provided for K-12 students when public health authorities decided to close the schools, or the potential impact on children of these closures.

Regardless if it was due to weather, natural disaster, or pandemics, in all of these illustrations the authors often described the aspects that schools needed to plan for in case they found themselves in the position of having to temporarily transition to distance and/or online learning to "sustain school operations when a disaster makes school buildings inaccessible or inoperable for an extended period of time" (Rush et al., 2016, p. 188). The list of topics included issues surrounding connectivity, device distribution, teacher preparation, instructional modalities, content creation/curation, etc.. Simply put, the potential to use K-12 distance and online learning to ensure continuity of learning in both the short-term and long-term has been both studied by scholars and utilized on numerous occasions. Which begs the question of why the world was so unprepared for March 2020?

3 THE ONSET OF THE PANDEMIC AND THE EMERGENCE OF EMERGENCY REMOTE LEARNING

On March 11th, 2020, the World Health Organization (WHO) declared SARS-CoV-2 (more commonly known as COVID-19) a global pandemic (WHO, 2020). Within days jurisdictions all around the world began to close schools. In the weeks following the closure of schools, education authorities began to explore the use of distance and online content and tools to provide some measure of continuity of learning for K-12 schools and post-secondary institutions. This type of learning became referred to as 'emergency remote teaching' or 'emergency remote learning.'

In what quickly became a seminal piece of scholarship related to this pandemic pedagogy, Hodges et al. (2020) described emergency remote teaching as:

> a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances. It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses and that will return to that format once the crisis or emergency has abated. The primary objective in these circumstances is not to re-create a robust educational ecosystem but rather to provide temporary access to instruction and instructional supports in a manner that is quick to set up and is reliably available during an emergency or crisis (para. 13).

This was contrasted with online learning, which was based on purposeful instructional planning, using a systematic model of administrative procedures and course development. Online learning also requires the careful consideration of various pedagogical strategies and determination of which are best suited to the specific affordances and challenges of local delivery mediums as well as the purposeful selection of tools based on the strengths and limitations of each one. Finally, careful planning for online learning also requires that teachers be appropriately trained to use the tools available and apply them effectively to facilitate student learning.

These lessons from these earlier illustrations were forgotten in most contexts. In contrast to the earlier SARS or H1N1 pandemic examples, or even the illustrations from weather-related or natural disasters, where online learning had been deployed to provide continuity of learning during these crisis situations, there was very little planned distance and online learning during Spring 2020. Many teachers found themselves unprepared for the challenges of using online content and tools to provide their students effective and meaningful learning experiences – a situation that has been foreseen for many years. For example, in the United States numerous studies have documented the lack preparation related to K-12 distance, online, and/or blended learning during their university-based teacher education programs and professional development provided by both brick-and-mortar and online schools (Archambault et al., 2016; Kennedy & Archambault, 2012; Rice & Dawley, 2007; Smith et al., 2005). Archibald et al. (2020) reported similar results in the Canadian context. These consistent findings over the two decades underscore the reality that the vast majority of teachers have had little or no exposure to K-12 e-learning or how to enact effective pedagogy and/or instructional design in that environment.

While there are many examples of responding to school and university closures in a time of crisis by implementing models that were contextually more feasible (e.g., correspondence, radio, television, mobile learning, etc.), these examples tended to be quite isolated in nature. For instance, places like Nebraska and New Zealand were able to fall back on using the postal mail system to provide paper-based packets developed for a correspondence model of education that had over a century of experience in delivering learning at a distance (German, 2020).

The Los Angeles Unified School District announced a plan with PBS SoCal/KCET to be able to pull educational programming from the network's library that would be broadcast throughout the school day to help provide access to instruction for students before the decision was even made to close any schools in March (Kohli & Blume, 2020). The difficulty was that these examples were the exception, as opposed to being part of a planned, robust response by school authorities. As Geerlof (2020) accurately summarized:

> The sobering reality, however, reflects the extent to which our leaders were ill-prepared for a pandemic of this magnitude: most of our leaders seemed to be taken by surprise. Many public leaders and governments had not taken the necessary health care precautions, and a majority of business leaders never anticipated having to lead their companies in a paused economy (para. 5).

The same can be said for school leaders. The majority had never anticipated, nor were they prepared, to lead their schools when they were closed indefinitely. Similarly, the majority of government officials had never anticipated how to provide public education when schools were closed indefinitely.

4 K-12 RESPONSE TO THE PANDEMIC

Emergency remote learning flourished during the Spring of 2020 when jurisdictions scrambled to provide online tools, online course content and devices to all teachers to provide some modicum of continuity of learning for students when schools suddenly closed in March (Nagle at al., 2020a). This emergency remote learning was the first and, in some cases, the second of the four phases of education's response to the pandemic (Barbour et al., 2020a).

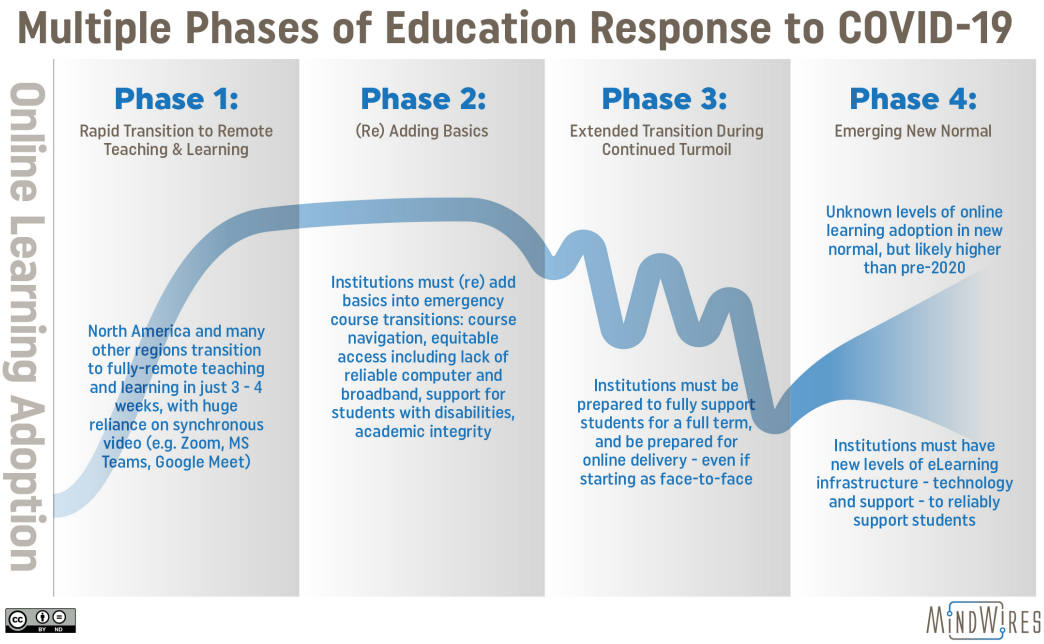

Figure 1. Four phases of educational response to COVID-19 in terms of remote and online learning adoption.

Each of these phases are described in the sub-sections below.

4.1 Phase 1: Rapid Transition to Remote Teaching and Learning.

Schools making an all hands on deck movement to remote delivery, often relying on synchronous video, with massive changes in just four weeks. Teachers do whatever they can to have some educational presence for all classes online. People have rightly pointed out that students' and teachers' health and safety are more important than worrying about quality course design or even equitable access. Think of this phase as "Put everything on *Zoom* and worry about details later." Substitute *Microsoft Teams* or *Webex* or *Collaborate* for *Zoom*, as so many teachers opted for the comfort of synchronous video discussions to replace the face-to-face experience.

4.2 Phase 2: (Re) Adding Basics.

Schools must (re)add basics into emergency course transitions: course navigation, equitable access addressing lack of reliable computer and broadband, support for students with disabilities, academic integrity. During this phase it is no longer acceptable to ignore issues of equitable access and course design. Schools must start to more fully address the question of quality of emergency online delivery of courses, as well as true contingency planning.

4.3 Phase 3: Extended Transition During Continued Turmoil.

Schools must be prepared to support students for a full term, and be prepared for online delivery – even if starting as face-to-face. During this phase, districts put plans in place to determine the mode of instruction based on the current realities of the pandemic. These plans should include adequate professional learning for teachers to ensure they have the skills and pedagogical knowledge to be able to implement the different instructional plans effectively. Alexander (2020) coined the phrase 'toggle term' to describe the shift of instructional delivery model "between states of lockdown and openness, depending on their sense of epidemiological data and practical feasibility" (para. 32).

4.4 Phase 4: Emerging New Normal.

This phase will have unknown levels of online learning adoption, but it is likely that it will be higher than pre-COVID-19 days. Schools must have new levels of online learning infrastructure – technology and support – to reliably support students. Essentially, the investment in various tools and infrastructure that schools have made during the pandemic can continue to be used post-pandemic. Additionally, as teachers and students become more comfortable with learning using these tools,

the chance that they will continue to use them post-pandemic increases significantly.

5 THE 2020-21 SCHOOL YEAR – TOGGLING BETWEEN MODALITIES

As the 2020-21 school year began school authorities should have been able to transition from emergency remote learning (i.e., Phases 1 and 2) that existed during the Spring 2020 to simply remote learning (i.e., Phase 3) for the start of the 2020-21 school year. It is important to underscore the fact that while remote learning requires more planning and preparation, it is still temporary in nature and those engaged in remote teaching still plan (hope) to return to classroom-based instruction. It is not the robust distance and online learning ecosystem traditionally experienced in the K-12 context.

There were five dominant models through which K-12 education was provided during the 2020-21 school year.

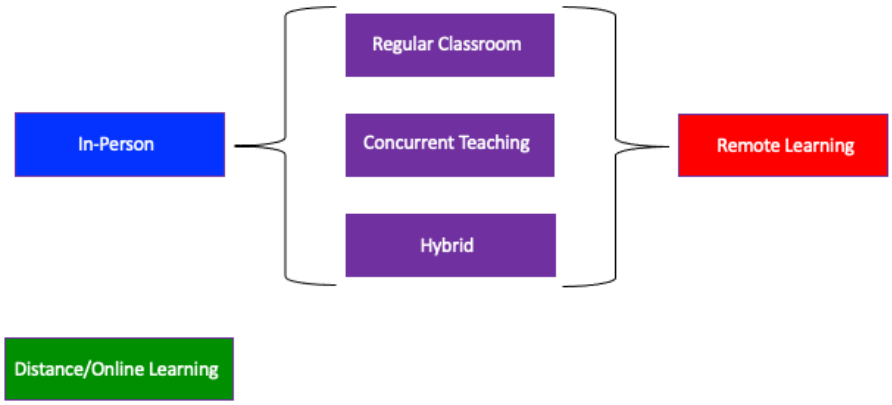

Figure 2. Various learning models available during the 2020-21 school year.

At the beginning of the year, many jurisdictions provided parents/guardians the option to enroll their students in school-based, in-person learning, or a distance, online learning, model. These two learning models were consistent with any other school year. **In-person learning** is the traditional model of K-12 schooling, where students are enrolled in a brick-and-mortar school and engage in their learning with teachers located at their school in a typical classroom setting. It is the kind of learning that many readers would have experienced throughout their own K-12 education. In some cases, these in-person students might take one or more courses at a distance because they were unable to access the course in their brick-and-mortar school for a variety of reasons. But even while engaged in these individual online

courses, this small number of students were still physically located in their brick-and-mortar school – often under the direct supervision of a teacher or paraprofessional in an online learning or computer lab, the learning resource centre or library, or even the back of a classroom. This form of supplemental distance learning (Barbour, 2019), for a very small population of students, has been available in most jurisdictions since the late 1990s or early 2000s.

While full-time **distance/online learning** has been available to K-12 students in most jurisdictions for some time, traditionally these students represented a very small percentage of learners – often less than 1% of the students enrolled in the K-12 system (Barbour et al., 2020b; Barbour et al., 2020c; Digital Learning Collaborative, 2020). However, during the 2020-21 school year, many jurisdictions gave parents/guardians the option to enroll their students in these full-time distance, online learning opportunities. For a variety of reasons (e.g., presence of immune-compromised family members in the household, general public health concerns about the community or region, concerns about the disruption from sudden school lock-downs and/or the back and forth between in-person and remote learning, etc.), parents/guardians decided to enroll their children in a model of learning where the student did not attend a brick-and-mortar school at all, but rather completed all of their learning at a distance online (Barbour, 2019). In most cases, these K-12 online learning opportunities were provided by existing distance and online learning providers – some of whom had a history of providing supplemental and full-time learning opportunities for over two decades. However, there were also instances where school authorities established their own distance education programs over the summer of 2020 – sometimes in partnership with an existing K-12 distance, online learning program and sometimes on their own.

Depending on the jurisdiction, there were also some learning models that combined aspects of the different mediums to accommodate various public health measures (e.g., mask wearing, physical and social distancing, restricted class size, cohorting, etc.). The measures related to physical distancing and restricted class size forced some schools to adopt a learning model where students were only in the physical classroom a certain portion of time. One such model is a **hybrid learning model**, which has one group of students learning in-person in their classroom and another group of students learning at home through distance, online learning.

Table 1. Typical schedule for a hybrid learning model.

Monday	Tuesday	Wednesday	Thursday	Friday
Learning Group A **In-Person**	Learning Group A **In-Person**	**Flex Learning Day** for all students	Learning Group A **Distance Learning**	Learning Group A **Distance Learning**
Learning Group B **Distance Learning**	Learning Group B **Distance Learning**		Learning Group B **In-Person**	Learning Group B **In-Person**

In this hybrid learning example, students in Group A would be in-person on Monday and Tuesday, then in a distance/online learning model on Wednesday,

Thursday, and Friday. Students in Group B would be in a distance/online learning model in-person on Monday, Tuesday, and Wednesday, then in-person on Thursday and Friday. Another common model would be alternating days.

Table 2. Typical schedule for a hybrid learning model.

		Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Group A	In-person	Distance	In-person	Distance	In-person
	Group B	Distance	In-person	Distance	In-person	Distance
Week 2	Group A	Distance	In-person	Distance	In-person	Distance
	Group B	In-person	Distance	In-person	Distance	In-person

This second hybrid learning model had one group of students in the classroom each day with the other group at a distance. Over the course of a two-week period each group of students would have five in-person days and five distance/online learning days.

The type of distance/online learning that was provided varied. In some instances, schools provided distance/online students with asynchronous course content created by their own teachers, provided free of charge from different online learning providers, and/or leased from an online content vendor. However, a more common hybrid model was the **concurrent teaching** learning model (also called co-seating or co-locating). In this model the classroom-based teacher taught some students who were in-person with the teacher in the physical classroom (i.e., colloquially referred to as 'roomies'). At the same time, the teacher's instruction was being streamed live through a video conferencing software such as *Zoom* or *Google Meet* or *Microsoft Teams* with other students logged in at home (i.e., colloquially referred to as 'zoomies'). Essentially, concurrent teaching was an individual teacher providing instruction in-person to roomies, broadcast online to zoomies at home (Molnar et al., 2021). Regardless if students were attending school in-person, through a hybrid schedule, or in a concurrent model, the local epidemiology of the virus caused schools in many jurisdictions to close all of their classroom-based instruction and revert to a **remote learning** model.

At present, much of the research has not engaged in an assessment of the educational response various governments have made during the pandemic. The limited research that has attempted to provide some form of evaluation has often relied upon perceptions of various stakeholders. For example, research out of the United States has also found that most teachers reported to not being adequately trained to design, deliver, and support learning remotely (Diliberti & Kaufman, 2020). Similarly, the Canadian Hub for Applied and Social Research (2021) at the

University of Saskatchewan found that while 63% of respondents indicated that online education delivery was a positive long-term change from the pandemic, 54% also felt that changes from COVID-19 would have a negative impact on children's education. Beyond this kind of perception data, the literature has focused on a perceived fear of potential impacts the pandemic might have on K-12 schooling (e.g., Moore et al., 2021).

Regardless of the local epidemiology of the pandemic, there appeared to have been little or no delay in the re-opening of schools for the 2020-21 school year in many jurisdictions (Nagle et al, 2020b). Initial research from both the United States and Europe has indicated that reopening schools in Fall 2020 increased the rate of community spread of COVID-19 (Casini & Roccett, 2021; Courtemanche, 2021; Goldhaber et al., 2021; Harris et al., 2021; Riley et al., 2020). However, this type of research on the spread of the disease in schools has not been systematically conducted in most jurisdictions. A deeper analysis of these health impacts could lead to recommendations that might help guide policy and improve safety in schools, which would subsequently impact how learning opportunities are provided. For example, both Ismail et al. (2021) and Larosa et al. (2020) stressed the importance of quick testing, isolation, and other preventative interventions to better control clusters that developed in school age children. This advice was consistent with more broadly focused research conducted by Kochańczyk and Lipniacki (2021), who examined 25 highly developed countries – as well as 10 individual US states – and found that jurisdictions that enacted quick, stringent, and sustained restrictions had lower case counts and death rates than jurisdictions that were slower to bring in restrictions or brought in looser restrictions. Additionally, Kochańczyk and Lipniacki also reported that those jurisdictions who enacted quick, stringent, and sustained measures had fewer restricted days overall, at least compared to those jurisdictions that were slow to act or brought in half measures.

6 LOOKING FORWARD

There are still a lot of unknowns about the COVID-19 pandemic itself, certainly including education's ability to weather the storm. However, most would agree that we've never before seen such a dramatic shift in the education landscape in such a short time period. It will be important to continue to monitor the potential positive and negative impact that such a dramatic shift brings. As the summer 2021 wanes, after 18 months of coping with pandemic school closures (including a full school year in many jurisdictions), most school authorities have once again focused on a 'safe' return to school buildings (Nagle et al, 2020b). Plans for a return to the 'new normal' (i.e., Phase 4) continue to be announced, with the opening of schools being the lynchpin to re-establishing both social and economic balance. Like in the past year, there continued to be more demand for remote learning options from some parents. Unlike in the past year, in many jurisdictions it is likely the majority of

students age 12 and older will be vaccinated – along with the majority of their teachers.

At the start of the 2021-22 school year some schools are likely entering Phase 3 (particularly those with younger students, where the start could be in-person learning). However, the potential for COVID-19 outbreaks in the unvaccinated population in schools and communities looms. In the United States, where many schools open in August, we have already seen schools closed as outbreaks of the Delta variant of COVID-19 erupt (Goldberg et al., 2021; Knutson, 2021; Zalazni, 2021). This reality will continue to be further complicated by the potential of vaccine resistant variants (Scheepers et al., 2021; Siebold & Fenton, 2021), as well as variants that may elude current testing regimes (Robertson, 2021). It is also important to point out that many US states have enacted laws or executive actions that prevent requiring masks and/or ban the use of remote learning (Blad, 2021; Center on Reinventing Public Education, 2021). While not handicapped by these same kinds of mandates, there is still real potential for school authorities in other jurisdictions to follow the same pattern as their American counterparts in terms of disease transmission within the school setting. The simple truth is that educators, parents, students, and the general public school expect the 2021-22 school year to continue to exist in Phase 3 – with a 'new normal' still somewhere on the horizon.

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