School Reopening and Learning Strategies During a Pandemic:

Resource Guide and Summary of the Research

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Table of Contents

Figures and Tables

Introduction

Purpose

This report summarizes the research on learning models and the issue of school reopening during Covid-19 and serves as a resource for K-12 educators in schools and school districts.

Several months ago, the world learned about a new and dangerous coronovirus that causes a potentially deadly disease called Covid-19 (Joseph et al., 2020, August 17).[1] First identified in Wuhan, China, the virus spread rapidly across the globe. The last time the world experienced such a phenomenon was during the 1918 Flu Pandemic. In 2020, this "once in a century" global pandemic has severely disrupted normal, everyday life and led to widespread closures of schools and businesses along with a massive decline in world-wide travel.

Many schools in the U.S. closed their buildings in Spring 2020 and turned to emergency remote learning to fill the void. Much more complicated than the decision to close schools has been the decision on how, when, and under what conditions to reopen schools.

This report is a summary of the research that I conducted using secondary sources (journal and news articles, reports, etc.) on learning models and on the issue of school reopening during Covid-19. I offer my findings as a resource for K-12 educators in schools and school districts.

In the first section, I cite my observations along with broad findings and recommendations about learning during and after Covid-19 based on the research and also on my background as an applied researcher in education who has studied the integration of technology into student learning. I also discuss some of the issues in the debate over reopening schools.

The second section is a resource guide on learning models. I present a glossary of terms and a series of tables that outline benefits, challenges, recommended guidelines, and other considerations for various learning models. The section ends with highlights from my overall findings in this area.

The third section is a brief discussion on assessments as it relates to learning during Covid-19, focusing on the importance of learning objectives based on standards and on the need to reflect on desired student outcomes.

[1] For a good review on what is known about Covid-19 to date, see this article (Joseph et al., 2020, August 17) at https://www.statnews.com/2020/08/17/what-we-now-know-about-covid19-and-what-questions-remain-to-be-answered/

I then submit works cited, and in the final section, I introduce an extended bibliography organized into various topics and categories that may be useful to educators. The extended bibliography includes links to readings and resources that were current and functional as of August 2020.

This work is part of a larger information-gathering project. For more information, please contact me at junehan@post.harvard.edu.

Learning During and After Covid-19

Observations

Schools that were already offering online learning or technology-enhanced learning in the classroom prior to the pandemic-related school closures were better equipped to provide remote online learning. Such schools are best equipped to continue instruction during closures for some types of emergencies, including pandemics (Schwartz et al., 2020).

As schools reopen in the Fall, they face both challenges and opportunities. The challenges are many, and they are substantial in terms of both logistics and preparing for instruction.[2]

In spite of the many challenges, there are also opportunities. While the focus was on teaching during a crisis in the months following school closures, there is an opportunity to be thoughtful and intentional in planning for the coming school year and beyond.

There is an opportunity to reimagine teaching and learning. The crisis gives us an opportunity to take a pause and imagine education systems in which all students can thrive (Arnove, 2020).

There are long-term opportunities to integrate technology as part of the instruction to deepen student learning. Before remote learning in the Spring, there were teachers who had never used online tools for learning. With the closing of schools, there was no choice but to turn to online learning, and there may be some teachers who continue to use online tools even after schools reopen. In all likelihood, the Covid-19 crisis will accelerate the integration of technology into student learning.

There is an opportunity to move toward more student-centered learning. In the face of significant disruption and continuing challenges, it is more important than ever to incorporate student voice so that students can take ownership of their learning and become "co-creators and partners in the learning process" (Quadir, 2020).

There is also an opportunity to develop authentic assessment of 21st century learning skills. Online learning and the integration of technology into the instruction have the potential to help students develop skills such as creativity, critical thinking, collaboration, and communication. Ultimately, the pandemic-related school closures may serve as a catalyst for the development of alternative assessment strategies (Quadir, 2020).

Debate on Reopening Schools

There has been an ongoing debate about the importance of students being physically present in school and how much physical distancing is required to maintain a safe environment in schools.

[2] The CDC's guidance on Operating Schools During Covid-19 discusses factors that school leaders must consider as it relates to data monitoring, testing, the use of masks, cleaning and disinfection, ventilation, food service, and physical distancing, among other factors.

The American Academy of Pediatrics (AAP, 2020) stated in June 2020 that it "strongly advocates that all policy considerations for the coming school year should start with a goal of having students physically present in school." With changing conditions and in the face of criticism and controversy, the AAP added in August 2020 the following statement to its guidance on reopening schools:

> Unfortunately, in many parts of the United States, there is currently uncontrolled spread of SARS-CoV-2. Although the AAP strongly advocates for in-person learning for the coming school year, the current widespread circulation of the virus will not permit in-person learning to be safely accomplished in many jurisdictions.

The AAP guidance goes on to discuss the negative impact of school closures on children in Spring 2020, including social isolation and academic learning losses. It points out the important role that schools play in identifying cases of child abuse, substance use, depression, and suicidal ideation and how school closures have led to a decline in food security and physical activity for some students. It also notes the "disproportionate impact" that school closures have had on "Black, Latinx, and Native American/Alaskan Native children and adolescents" (AAP, 2020).

Whereas the AAP once suggested that "spacing as close as 3 feet may approach the benefits of 6 feet of space, particularly if students are wearing face coverings and are asymptomatic," its guidance now states that "desks should be placed at least 3 feet apart, and ideally 6 feet apart." It goes on to add that "[s]chools should weigh the benefits of strict adherence to a 6-feet spacing rule between students with the potential downside if remote learning is the only alternative" (AAP, 2020).

The CDC guidance, on the other hand, recommends "[s]pace seating/desks at least 6 feet apart when feasible," and it notes that "[t]he many benefits of in-person schooling should be weighed against the risks posed by Covid-19 spread."

School fulfills an important role not only in learning, but in the social and emotional development and well-being of students. School is about more than content knowledge acquisition; it provides opportunities for socialization and a sense of community for many students. Additionally,

> [s]chool provides a structured setting in which children can learn and develop social competencies, such as self-confidence, friendship, empathy, participation, respect, gratitude, compassion, and responsibility … Learning objectives can be achieved remotely (and evaluated to some extent), but the core mission of any school system also comprises the promotion of students' wellbeing (Colao et al., 2020).

School leaders must consider the extent of Covid-19 community spread in their area along with updated public health guidelines and ultimately weigh the costs and benefits of reopening schools. A range of people, from doctors to educators and parents to policy makers, have argued that the social and academic costs of school closures on children need to be weighed alongside the risks of the virus itself (Goldstein & Shapiro, 2020, July 11). According to Viner et al. (2020), "[r]ecent modelling studies of COVID-19 predict that school closures alone would prevent only 2-4% of deaths, much less than other social distancing interventions" (p. 397). They go on to add that policy makers should consider combinations of social distancing measures that are less disruptive than closing schools, especially if restrictive social distancing policies need to be implemented over long periods of time (Viner et al., 2020). While some medical experts point out that school closures would prevent only 2-4 percent of

deaths, is this an acceptable cost given the many benefits of opening schools? These are the kinds of decisions that school administrators are being asked to make.

In May 2020, the World Health Organization (WHO) advised that before reopening, Covid-19 infection rates should remain at 5 percent or lower for at least 14 days in any given area.[3] While this recommendation was not specifically made regarding schools, it has emerged as a metric that many school districts are considering in their school reopening plans. However, the rate is only a reliable indicator when there is widespread testing, and many states in the U.S. are still not doing enough testing (Goldstein & Shapiro, 2020, July 14).

Many teachers and school leaders have concerns about reopening schools. There are concerns about school and building readiness and policies around mask wearing and physical distancing in classrooms and schools. Teachers and staff fear for their own health and safety along with the health and safety of their families. Goldstein and Shapiro (2020, July 11) point out that "[s]chool systems struggling to meet the financial and logistical challenges of reopening safely will need to carefully weigh teachers' concerns. A wave of leave requests, early retirements or resignations driven by health fears could imperil efforts to reach students learning both in physical classrooms and online." Almost 30 percent of the more than 3.8 million full-time teachers in the country are older than 50, and about a third of school principals are over 55, putting them at high risk of severe illness from Covid-19 (Mandavalli, 2020, July 15).

Ultimately, whether in-school or remote, consistency in schooling and learning can protect young people who are experiencing stress and other challenges. Reich et al. (2020) state that "[t]he research on education in emergencies suggests that continued schooling and learning can be a protective factor helping young people cope with stress and challenges during periods of disruption" (p. iii). As such, the work of schools in providing consistent instruction and support is more important than ever.

Broad Findings and Recommendations

Schools and school districts need to be flexible and prepared for a wide of range of options. They should incorporate both in-person and remote learning strategies as they will need to be flexible with changing circumstances. Many school districts plan to start with remote learning in Fall 2020. However, circumstances may change to allow for in-person learning in the future. To make transitions smoother and easier between in-school, blended, and remote learning, schools and school districts should "identify appropriate curricula that have both in-person and remote strategies, leveraging technology where age appropriate, and linked to specific learning objectives" (Sharfstein & Morphew, 2020). While no single learning option is likely to work for all students or in all scenarios, Schwartz et al. (2020) argue that "being prepared to offer a variety of instructional modes under different conditions can help bridge long periods of school closure and better support students" (Schwartz et al., 2020, p. 17).

Schools and school districts need to increase their focus on special student populations. Students within this group include students with disabilities, low income students (i.e., students who qualify for free or reduced meals at school), students from underserved racial minority groups, and English learners. Other students in this group include children in foster care, children experiencing homelessness, and youth in incarcerated settings (Reich et al., 2020).

[3] See https://coronavirus.jhu.edu/testing/testing-positivity for more information.

On-site education should be prioritized for students who experience barriers to remote learning and those who are identified as being at higher risk. Other than the groups mentioned previously, younger students are another group that may find remote online learning challenging. Schools should also consider offering additional in-school time and support to students who are most at risk of falling behind academically (Sharfstein & Morfew, 2020).

In general, younger students face more challenges with remote online learning than older students. Younger students do not have the same level of autonomy and independence as older students. Additionally, they may not always understand the larger significance of what they are learning. One of the biggest concerns about remote learning is the lack of social interaction and the potential harm this may cause, especially to younger students (see Rice, 2006). Picciano and Seaman (2007) note that "[i]n K-12 schools, especially at the primary and middle school level, the social and emotional development of students is an important aspect of the overall school experiences" (p. 19). They go on to add that a blended learning approach may ease this concern by providing some face-to-face interaction.

On the other hand, these are generalizations, and there are differences among individual students to consider as well. Some younger students may do well with remote learning, whereas there may be some older students who struggle with learning remotely. Another factor to consider is that older students may face larger learning declines than younger students from the lack of in-class instruction, especially in math (see Borman, 2020).

If at all possible, give families a choice as they will know best which learning model or option fits best for their individual child and for their particular circumstances and/or situations. If schools and school districts plan to give families a choice, they should grant special consideration for in-person schooling requests to students from special populations (i.e., students with disabilities, students who qualify for free-or-reduced meals, English learners, etc.). Overall, in-person schooling should be more of a priority for younger students as they tend to have a harder time with remote online learning. However, older students who are struggling in school (especially in math) and are at higher risk academically should be made a priority as well.

While some studies have shown that younger students are less likely to transmit the virus than older students, the research in this area is inconclusive. A large study from South Korea showed that while children under the age of 10 transmit the virus to others much less often than adults, children who are ages 10-19 can spread the virus to the same degree as adults (see Mandavilli, 2020, July 18). On the other hand, another study about a Georgia sleepaway camp for children ages 6-19 showed how quickly the virus could spread among both older and younger children. The camp, which did not require campers to wear masks, closed within days of opening (Joseph et al., 2020, August 17). Also, while overall infection rates remain low for children and it is rare for them to become seriously ill with Covid-19, a small proportion of children who are infected develop a condition called Multisystem Inflammatory Syndrome in which the body's immune system attacks multiple organs (Joseph et al., 2020, August 17). With regard to children, the overall issue of Covid-19 is complicated, and further research is needed. School leaders need to stay up to date on the research in this area.

A substantial percentage of parents and guardians have expressed that they are not comfortable with their students attending school in-person in the Fall. Many districts are surveying parents to better understand their comfort level with reopening school buildings. They are finding a significant minority — up to a third of parents in some large districts — do not want to send their children into classrooms (Goldstein & Shapiro, 2020, June 26). If potentially up to 1/3 of families prefer that their students do

100% remote online learning, that may leave open more socially distanced options for other families that prefer more in-class instruction.

Survey data suggests that low income Black and Hispanic parents are more fearful and wary about sending their children to schools when they reopen. In an online survey among parents with children in New York State public schools in August 2020, higher income white parents indicated more of a willingness to send their children to schools reopening in the Fall than lower income Black and Hispanic parents.[4] This finding corresponds with data from the CDC that shows that Black and Hispanic people, including children, have been disproportionately affected by Covid-19 with regard to infection rates, hospitalizations, and deaths.[5] At the same time, low income Black and Hispanic students are among those who have been most negatively impacted by the shift toward remote online learning. As school leaders plan for reopening schools, they will need to take the needs and concerns of low income Black and Hispanic students and their families into special consideration.

When considering what to do, school leaders should ask: Is it equitable? Is it inclusive? Is it effective? Effectiveness is about looking into whether a program or initiative is producing the desired outcomes. Inclusion is about ensuring that no students are excluded from the learning process, and equity is about working to ensure that no students are left behind (Quadir, 2020).

Schools and school districts should continually inquire, experiment, and reassess. They should encourage inquiry and experimentation while providing consistent support. Geiger and Dawson (2020) point out that

> [a] stance toward inquiry and experimentation has been shown to lead to improved student outcomes and a strong sense of professional competence … which serves teachers well at all times but particularly in trying times such as emergency remote teaching. We recommend teacher educators instill a sense of professionalism in teachers by scaffolding and supporting cycles of inquiry that allow them to study pressing problems they experience in their practice (p. 258).

School leaders should take risks and lean forward. In an interview regarding at-home learning during the Covid-19 crisis, the CEO of Distinctive Schools, Scott Frauenheim, made the point that "[t]his is our opportunity to test, pilot and prototype" (Lockett, 2020, March 27).[6]

The current situation provides schools with a unique opportunity to learn about and invest in technology-enhanced instruction. School leaders should take the time to reflect on lessons learned with a vision toward the future. When the pandemic eventually subsides, here is a question for school leaders to consider: What are elements of remote, online, and blended learning that worked well and what parts of those models could we potentially incorporate into longer-term plans for instruction?

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[4] The survey was conducted by the Global Strategy Group in partnership with The Education Trust–New York.
[5] See https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html and https://data.cdc.gov/NCHS/Deaths-by-Race-and-Hispanic-Origin-Ages-0-18-Years/32c3-mvuz for more information.
[6] Distinctive Schools is a network of eight charter schools that includes Chicago International Charter School (CICS).

Resource Guide on Learning Models

This section is meant to be a guide for schools and school districts on learning models that may be useful both during and after the Covid-19 pandemic crisis. I obtained information from various sources that are listed throughout the Works Cited and Extended Bibliography sections, and this Resource Guide represents a summary of my findings. I also present highlights from my findings toward the end. In order to present the information in a concise and streamlined way, I limited the parenthetical citations in this section. Please contact me at junehan@post.harvard.edu for more detailed information.

Glossary of Terms

Blended (or Hybrid) Learning: Learning in which online learning is combined in some form with traditional in-class, face-to-face instruction.

Blended Synchronous Learning: Technology-supported learning in which online students and classroom students can participate in the same class activities in real time.

Distance (or Remote) Learning: Instruction that uses electronic technologies to connect and support interaction between students and teachers who are separated by time and/or space.

- The electronic technologies could include the internet or telecommunications systems that allow video and audio conferencing.

- A broader term called distance education also includes instruction delivered through nonelectronic methods, such as correspondence study.

Face-to-Face Learning: Learning in a central location, usually in a brick-and-mortar building such as a school, with an instructor.

- This type of instruction is sometimes called in-class or in-person learning.

Online Learning: Learning in which instruction and content are delivered primarily through the internet.

- Online learning is the most common form of distance learning.

- Within online learning, there is both synchronous and asynchronous learning.

    - **Synchronous Learning** (real-time): Instruction and communication between students and teachers occur in real time, whether in a physical or virtual place.

    - **Asynchronous Learning** (delayed-time): There is a time lag between the presentation of instruction and student responses, with students working at different times.

Personalized Learning: Learning that aims to be tailored for each student by incorporating automated and/or student-centered pedagogies.

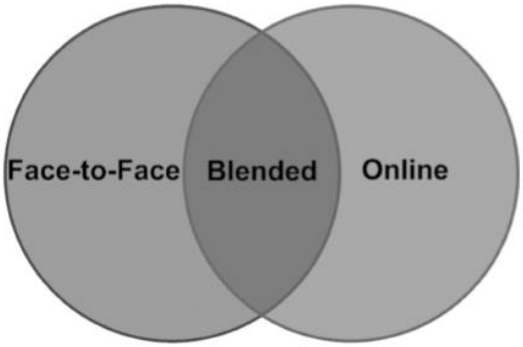
On Communications and Messaging

Though Distance Learning is more commonly used than Remote Learning in the research literature, Remote Learning may be a preferable choice for schools and school districts in their communications with students, families, and the general public. The word "distance" serves as a reminder that students are physically separated from their teachers and peers, which during the Covid-19 crisis could be a traumatic reminder for some. As a result, I use the phrase Remote Learning throughout most of this report. In general, the research more commonly refers to Blended Learning over Hybrid Learning. I use the phrase Blended Learning in this report to better reflect how it is stated in the literature.

Information on Learning Models

Larson and Archambault (2015) identify three basic or fundamental forms of learning: (1) Face-to-Face, (2) Online, and (3) Blended. The relationship between the three forms of learning is shown in Figure 1.

Figure 1. Relationship Between Learning Models



As shown in Figure 1, Face-to-Face Learning and Online Learning can each exist independently, or they can be combined to form Blended Learning, which incorporates elements from both learning models (Larson & Archambault, 2015).

On the following page, Table 1 lays out the definitions, subcategories, examples, and notes for each of the three basic learning models (see Table 1).

Table 1. K-12 Learning Models (Face-to-Face, Online, Blended)

Learning Model	Definition	Subcategories	Examples	Notes
Face-to-Face	Learning in a central location, usually in a brick-and-mortar building such as a school, with an instructor.	Traditional	Most private and public schools in the U.S.	Sometimes called in-class or in-person learning or brick-and-mortar learning.
		Technology-Enhanced	Schools and classes that integrate technology into in-class instruction	Traditional face-to-face learning where the instructor also uses or manages technology to enhance the delivery of content and/or instruction.
Online	Learning in which instruction and content are delivered primarily through the internet.	Formal	Florida Virtual School (FLVS Full Time)	Online learning can be synchronous (real-time) or asynchronous (delayed-time). Formal online programs are structured and accredited.
		Informal	Dreambox Learning, educational games	
Blended	Learning in which online learning is combined in some form with traditional in-class, face-to-face instruction.	Rotation Model	Rocketship Public Schools	The student, as part of a particular class or course, moves on a fixed schedule between face-to-face learning and at least one online element.
		Flex Model	iPrep Academy	The student learns on an individually defined schedule, moving between primarily online learning and varying types and degrees of face-to-face learning.
		Self-Blend Model	Florida Virtual School (FLVS Flex) and all other online schools that offer a la carte courses that can be taken remotely	The student elects to pursue at least one formal online course in addition to their traditional, face-to-face program.
		Enriched-Virtual Model	eCADEMY Virtual High School	The student learns almost entirely online with minimal face-to-face learning within each of the courses.

Note: Adapted from Larson & Archambault, 2015, p. 173 and also includes information from Horn & Staker, 2011, p. 5.

Table 2 lays out similar information for two alternative learning models: Remote Learning and Personalized Learning (see Table 2).

Table 2. K-12 Alternative Learning Models (Remote and Personalized)

Learning Model	Definition	Subcategories	Examples	Notes
Remote Learning	Instruction that uses electronic technologies to connect and support interaction between students and teachers who are separated by time and/or space.	Online	Florida Virtual School (formal); also what many schools in the U.S offered in the months during the Covid-19 pandemic-related school closures	Electronic technologies could include the internet or telecommunications systems. Online learning is the most common form of remote learning. Remote online learning could stand alone as a full-time online learning program, or it could be used as part of a blended learning model. Offline remote learning is more common in developing countries without a strong technology and internet infrastructure.
		Offline	Students who use offline and printed materials to learn and have check-in meetings with their teachers by phone (i.e., because they do not have internet access)	
Personalized Learning	Instruction that aims to be tailored for each student by incorporating automated and/or student-centered pedagogies.	Face-to-face (Traditional)	Montessori schools	Montessori schools focus on student-centered learning and strictly limit technology use.
		Face-to-Face (Technology-Enhanced)	Instruction where teachers incorporate automated online learning tools and/or digital assessments, dashboards, and profiles (such as those provided by Dreambox Learning and STAR Testing)	Schools and school districts can choose to move toward more automated and/or student-centered pedagogies to make learning more personalized.
		Online	Florida Virtual School (formal), Dreambox Learning (informal)	Dreambox Learning is a fully automated personalized online learning program.
		Blended	Rocketship Public Schools, Summit Learning	Summit Learning is run by T.L.P. Education and is supported by the Chan Zuckerberg Initiative.

Table 3 lays out information for two learning models of interest for K-12 schools during the Covid pandemic crisis: The Blended Rotation Model and Blended Synchronous Learning (see Table 3).

Table 3. Learning Models of Interest (Blended Rotation and Blended Synchronous)

Learning Model	Definition	Subcategories	Notes
Blended Rotation Model	Learning in which students in a given course rotate on a fixed schedule between online learning in a self-paced environment and sitting in a traditional classroom with a face-to-face teacher. It is the model most in between face-to-face learning and online learning because it involves a split between the two and, in some cases, between remote and onsite learning. The face-to-face teacher usually oversees the online work.	Modified Tutorial	The Modified Tutorial model often employs a flipped classroom where lectures and/or lessons could be delivered online for asynchronous learning with in-person small group meetings for student discussions and time in class to complete assignments and projects under the guidance of the instructor.
Blended Synchronous Learning	Technology-supported learning in which online students and classroom students can participate in the same class activities in real time.	HyFlex	The HyFlex model sounds very similar to Blended Synchronous Learning. HyFlex, however, allows for more student choice as students get to decide either to attend in person or online at any given time. Also, there is an asynchronous component to this model. While classes are streamed live, they can be recorded so that students who cannot or choose not to attend class either in-person or online can access the classroom recordings at a later time.

As seen above, Modified Tutorial is a subcategory of the Blended Rotation Model, whereas HyFlex could be seen as a subcategory of Blended Synchronous Learning (see Table 3).

On the following pages, see Tables 4-6 which outline benefits, challenges, and other information for Remote, Online, Blended, Blended Synchronous, and Personalized Learning.

Table 4. Pros and Cons of Remote and Online Learning

Learning Model	Benefits	Challenges	Recommended Guidelines	Other Considerations
Remote Learning	Can minimize learning loss associated with school closures, give students a routine, promote physical distancing. Can be an effective means of content knowledge acquisition. Increases educational access for students who cannot participate in the classroom. Can also provide students with a feeling of autonomy and allow students to work at their own pace. Some students prefer and do better with remote learning than traditional in-class learning.	Difficult to ensure equity and inclusion – some students lack WiFi, digital device, quiet space to do work, parents with time or ability to help. Some must work or care for younger siblings. Greater challenges for students with disabilities, low income students, and English learners. Also more difficulties for younger students. No consensus on what the focus of remote learning during the pandemic should be. Social isolation and loneliness. Challenges for working parents who must oversee remote learning. Lack of motivation by some students. Many supports are required for student success.	Strive for equity and inclusion, communicate clear expectations, refer to the ISTE Standards. Focus on student-centered learning and the importance of student voice. Tend to the whole child – not just academic, but also social and emotional needs. Consider virtual field trips and other free educational resources. Seek to have daily personal connections and build learning communities. Younger students need more supervision and reinforcement, fewer and easier instructions, and lessons in smaller segments with no distractions.	While online learning is the most common form of remote learning, it is not the only option. Some students do better than others with remote learning. High quality teachers are important for student success in both in-class and remote learning environments. Clear, consistent, and accessible communication is important. Remote learning is merely a medium for delivering instruction. There have been some theoretical and conceptual frameworks developed in the study of distance learning.
Online Learning	Can offer flexibility, greater educational access, and cost effectiveness. Can enhance the quality of learning experiences. Synchronous online learning is more interactive than other forms of remote learning. Can offer instant feedback on student performance and efficient data collection on individual and group performance. Can be an attractive replacement for in-class instruction when needed.	Same as above. Additional challenges: Lack of continual expressive exchange and feedback. Inconsistencies in the quality of online instruction. Need to establish attendance requirements, assessments, and grading policies. Issues with student and staff readiness and need for consistent, high-quality professional development. Slow broadband speed and technical problems. Issues with limited technological infrastructure and digital capacity. Negative effects of too much screen time. Online learning may not work well for all subject areas.	At a minimum, schools need a learning management system (LMS), online course content, policies to address student access to devices and the internet, support for students and teachers, and ongoing training for teachers. Focus on big ideas and aim for more authentic and meaningful learning rather than "covering" topics. Enhancing social presence and humanization are strategies that can help bridge the physical distance between students and teachers in online learning environments.	Online instruction is not just useful for the transmission of knowledge; it can facilitate different types of student learning, including learning that is more active and interactive. There are teaching strategies to make online learning more engaging and responsive – focus on connecting with students and on building relationships and learning communities, incorporate student voice, and make learning interesting and relevant for students.

Table 5. Pros and Cons of Blended and Blended Synchronous Learning

Learning Model	Benefits	Challenges	Recommended Guidelines	Other Considerations
Blended Learning	Can combine the best of classroom and online teaching and learning. Can support students with differentiated instruction and individualized feedback through automated data systems - has the potential to make learning more personalized. May be a better option for elementary and middle school students than 100% online learning - social and emotional development is important for younger students, and online learning generally works better for older students.	Requires a great deal of thoughtfulness, effort, and engagement to do it well. It is time-consuming and will most likely increase teachers' workload. Not as cost-effective as online learning. Blended learning is well-suited for student-centered learning, which would require a big change in mindset by some teachers. Some teachers may be resistant to the type of change that is required to implement blended learning, especially those who are resistant to the use of technology in instruction.	Classroom and online learning modes and resources should be well-integrated. Blended learning should be incorporated into teacher professional development. It requires a long-term investment in time and resources to make a successful shift to blended learning.	Most of the research in this area is exploratory, focusing on concepts, frameworks, and the potential of blended learning. While it is ideal for teachers to be able to choose the most appropriate blended learning model, it does not always happen in terms of implementation.
Blended Synchronous Learning	Allows students who are learning remotely to participate in class activities in real time, which can lead to more active learning, interaction, engagement, and a greater sense of community. Can provide students with greater educational access – offers flexibility and convenience. Can save teachers time from not having to repeat lessons.	Difficulty of teachers having to balance the learning needs of face-to-face and remote learning students – can lead to cognitive overlaod caused by split attention. Requires a great deal of focus and effort by teachers to create and manage a blended synchronous learning environment (BSLE). Not many relevant professional development opportunities. There are also challenges for students, both online and in the classroom, including technology-related problems.	Classes and instruction need to be redesigned for blended synchronous learning. Important to have the right technology set-up. Need to ensure smooth communication between instructor, classroom students, and online students. Instructors must pay balanced attention to classroom and online students. Teachers need assistance and support in the classroom. In addition to being well-prepared and organized, teachers must be clear, composed, and flexible. Students must also be prepared in advance for learning in a BSLE.	Most of the research to date on blended synchronous learning has focused on students in higher education. The instructor should determine in advance how students answer questions posed to the entire class as there is generally an audio lag for online students. Researchers do not agree as to whether (text) chat features should be used or disabled. If used, the chat feature should be monitored by a student or teaching assistant.

Table 6. Pros and Cons of Personalized Learning

Learning Model	Benefits	Challenges	Recommended Guidelines	Other Considerations
Personalized Learning	It is instruction that tailored for each student. Supports student-centered learning and encourages student voice and choice. Idealized benefits: Learners have the agency to set their own learning goals and pathways. Within this idealized model, online and blended learning provide educators with tools to implement personalized learning at scale for every student. A competency-based education system provides students with multiple ways to demonstrate what they have learned, and standards set the benchmarks for success and serve as a foundation for student learning.	Personalized learning (in its idealized form) would require an instructional model change and a large paradigm shift. Many educators are unclear about what personalized learning actually means and how it can be translated into instructional practice. Significant challenges: Teachers lack time to prepare personalized lessons, and there is a wide range in student ability and achievement. Also, many teachers do not feel equipped to provide students with individualized instruction using the assessment data and resources provided by personalized adaptive learning software.	Lokey-Vega and Stevens (2019) propose a Personalized Learning Continuum Framework, pointing out that personalized learning encompasses both online schools and programs that focus on automated pedagogies and models like Montessori that strictly prohibit the use of technology in instruction and focus only on student-centered pedagogies. They argue that in many personalized learning models, "these philosophically-opposed approaches are likely used in some unique combination best suited for the context and the individual learner resulting in a scaled custom educational experience" (p. 322).	The idealized version of personalized learning would be difficult to implement in the traditional, face-to-face instructional model within a K-12 public school because of the challenges identified earlier. On the other hand, if personalized learning can be seen as a continuum, then schools and school districts can choose to move toward more automated and/or student-centered pedagogies to make learning more personalized.

Highlights and Insights

The following presents highlights from my findings along with additional insights regarding some of the learning models.

Insights on Remote Online Learning

For the foreseeable future and until Covid-19 subsides, most schools and school districts in the U.S. will be engaging in remote online learning. See below for some tips and insights:

- Do more with less - focus on big ideas rather than trying to "cover" topics.
- Aim for more authentic and meaningful learning and for more student-centered learning that incorporates student voice.
- Break up online lectures and lessons into engaging and smaller, more easily digestible chunks.
- Too much screen time can be detrimental to students.
- There should be a balance between synchronous (real-time) and asynchronous (delayed-time) learning as there are pros and cons to both.
- In some ways, 100% remote online learning may be more of a challenge when schools reopen in the Fall. Students and teachers will be more familiar with the format. However, schools shifted to remote online learning in the last few months of Spring 2020, after relationships and a learning community had been established in most classrooms. In the Fall, many students will be with new teachers and classmates, and new relationships and learning communities will need to be established, which is more difficult in an online-only setting. To address these types of challenges, some schools and school districts are choosing to have the same teachers instruct the same students from last year—essentially having teachers “move up” with their students to the subsequent grade level.
- Teachers and other school staff should seek to have daily personal connections and build relationships and learning communities. Enhancing social presence and humanization, basically the ability to convey oneself as “real” in a virtual setting, are strategies that can help bridge the physical distance between students and teachers in online learning environments. As with other forms of instruction, teachers should strive to make learning interesting and relevant for students.
- Schools will need to pay particular attention to students who are transitioning to middle school and high school and to new students in general. Onboarding training may be needed for those students and their parents or guardians to familiarize them with the school, including around policies and procedures for technology use. These populations may need ongoing attention and support throughout the school year.

Advantages of Blended Learning

The following are some advantages that Blended Learning may provide:

- Blended Learning may be the most natural extension of the technology-enhanced instruction that some schools and classrooms were offering before the Covid-19 pandemic.
- It is a model that allows educators in theory to take the best of both in-person and online learning.
- While online remote learning may serve as a substitute for content knowledge acquisition, it can over time lead to loneliness and social isolation. A blended learning environment would provide students with socialization and opportunities for social and emotional growth and development.
- Some educators and scholars see potential in Blended Learning as a promising pathway for more student-centered, differentiated, and personalized learning.

Blended Rotation Model vs. Blended Synchronous Learning

As previously noted, Blended Rotation and Blended Synchronous Learning along with their subcategories, Modified Tutorial and HyFlex, have come up as learning models of interest within K-12 education (see Table 3). HyFlex may offer too much choice and flexibility to K-12 students as the model allows students to decide whether to attend classes in-person or online at any given time.

The Modified Tutorial model may feel familiar to schools that offer tutorials in which teachers provide students with extra help and support in the classroom, usually before or after school. With this model, teachers will need to record their lectures and/or lessons for asynchronous online learning. Additionally, they may have to lead multiple small group meetings in order to follow social distancing guidelines. However, they will not need as much support with technology. Another benefit is that the tutorial portion could move online, if necessary, which provides some flexibility in case schools need to close.

There are teachers who have the technology and instructional skills to implement Blended Synchronous Learning. Perhaps schools and school districts could prototype the model with a limited number of teachers who have the ability to put together a BSL class. Teachers will need the right technology set-up and in-class support in order to be successful. In general, this model will work better with older students as it requires a great deal of focus and patience on the part of both students and teachers (see Table 5 for more on the pros and cons of Blended Synchronous Learning).

Personalized Learning as a Continuum

The idealistic model of personalized learning in which instruction is completely tailored to the needs and interests of each student and in which students have ultimate voice and choice in their learning is an unrealistic proposition for most K-12 public schools. On the other hand, the concept and framework of personalized learning as a continuum is useful in that educators can choose to move toward making learning more personalized by incorporating automated and/or student-centered pedagogies.

On Assessments

Assessments should take into consideration the whole child. Miller et al. (2020) state that "[w]ith regard to assessment, it is important to attend to the whole child with the understanding that social, emotional, and academic needs are interconnected" (p. 39). This is especially important in light of the many disruptions caused by the pandemic crisis.

Teachers should set learning objectives based on established standards. For schools and school districts, this may mean aligning learning objectives to state standards and/or other standards relevant to specific disciplines.

With online remote and blended learning, schools and school districts will also need to reflect on student outcomes. Other than content knowledge, what are some other desired student outcomes?

As content delivery becomes increasingly digital and online, there will be a need to identify or develop new assessments. Teachers can take advantage of online assessments that provide instant feedback and allow efficient data collection on individual and group performance (Kumi-Yebaoh & Smith, 2014). However, they will need training on how to incorporate results from online assessments effectively.

Assessments should be used throughout the school year to evaluate students' learning needs and progress. According to Borman (2020),

> [e]ducators should be prepared to use formative assessments to evaluate where students are academically in the fall. This information should then be used to target the specific needs of students through supplemental and/or differentiated instruction … spring end-of-year assessments could be used to identify students who continue to struggle and these students could be served through supplemental 2021 summer programs (p. 3).

Projections suggest that when school starts in Fall 2020, students will return with about 70 percent of their typical reading gains and less than half of their usual math gains. Borman (2020) states that "economically disadvantaged and minority students will return to school with more ground to make up academically" and predicts "greater declines in math than reading skills and with older students experiencing greater disadvantages than younger students" (p. 2).

Assessments should be timely in general, but even more so with remote learning. Respondents in a recent study concluded that timely assessment of student understanding is "especially critical when implementing distance learning" (Schwartz et al., 2020, p. 8).

Students need to learn how to do better self-assessments of their learning. Quadir (2020) points out that self-regulatory attributes, such as self-monitoring, self-evaluation, and self-teaching are associated with higher quality learning and performance. One study noted that using mechanisms to prompt student reflection on their level of understanding and the use of self-assessments were an effective online learning practice (Means et al., 2010).

Assessments should allow for personalization. In general, personalized assignments and assessments are more engaging for students. Generic assignments and assessments, on the other hand, make it easier and more tempting for students to cheat (see Quadir, 2020).

As previously mentioned, there is an opportunity to develop authentic assessment of 21st century learning skills. According to Quadir (2020),

> [t]he silver lining accompanying the COVID-19 pandemic can be that it catalyzes the development of alternative assessment strategies needed for 21st century learning. Learners should be able to demonstrate performance on authentic tasks (which simulate realistic environments and problems that the learner would face in the real-world). Due to the non-feasibility of in-person exams in many parts of the world during COVID-19, alternative assessment strategies for open-ended real-world authentic problems can be developed and tested.

This may be a good time overall to inquire, experiment, and reassess, with authentic assessment as well as with other teaching and learning strategies.

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Other Online Resources

Learning Resources

DePaul College of Education – K-12 Online Teaching Resources
https://education.depaul.edu/covid-19-resources/Pages/k-12-online-teaching-resources.aspx

EdSurge
https://www.edsurge.com/

Edutopia
https://www.edutopia.org/

Iowa Department of Education – Resources for Online Learning
https://educateiowa.gov/general-resources-educators-moving-online-learning-students-during-covid-19

ISTE | EdSurge – Navigating Uncertain Times
https://www.edsurge.com/research/guides/navigating-uncertain-times-how-schools-can-cope-with-coronavirus

ISTE – Online Resources from ISTE Community Members
https://docs.google.com/document/d/1RpX_IAUt28fqqnO356EbOKxyY1_mwtVbepG2DdaVeWU/edit

ISTE Standards
https://www.iste.org/standards

Assessment Resources

Assessing Social Emotional Learning
https://www.edutopia.org/article/assessing-social-and-emotional-learning

Formative and Summative Assessment in Online Education
https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1038&context=chs_pubs

Formative Assessment in Distance Learning
https://www.edutopia.org/article/formative-assessment-distance-learning

Formative Assessment is Foundational to Blended Learning
https://thejournal.com/articles/2012/11/14/formative-assessment-is-foundational-to-blended-learning.aspx

SEL and Assessment
https://casel.org/sel-assessment/

Summative Assessment in Distance Learning
https://www.edutopia.org/article/summative-assessment-distance-learning

75 Digital Tools and Apps Teachers can use to Support Formative Assessment in the Classroom
https://www.nwea.org/blog/2019/75-digital-tools-apps-teachers-use-to-support-classroom-formative-assessment/

Other Learning Resources

Edgenuity – Blended Learning Resources
https://www.edgenuity.com/blended-learning-resources/

Florida Virtual School – School and District Solutions
https://www.flvs.net/district-school-solutions

Impact Public Schools – Impact at Home
http://impactps.org/distance-learning

K12 – How Curriculum is Developed
https://www.k12.com/about-k12/how-our-curriculum-is-developed.html

Michigan Virtual – Resoures
https://michiganvirtual.org/resources/

Rocketship Public Schools – End-of-Year Learning Goals
https://www.rocketshipschools.org/distance-learning/eoy-benchmarks/

Summit Learning – Blog regarding Covid-19
https://blog.summitlearning.org/tag/covid-19/

Public Health Resources

CDC – Considerations for Operating Schools During COVID-19
https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcommunity%2Fschools-childcare%2Fguidance-for-schools.html

CDC – Considerations for Wearing Masks
https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html

CDC – Covid Data Tracker
https://covid.cdc.gov/covid-data-tracker/?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcases-updates%2Fus-cases-deaths.html#cases

CDC – Covid-19 Hospitalization and Death by Race/Ethnicity
https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html

CDC – Deaths by Race and Hispanic Origin, Ages 0-18 Years
https://data.cdc.gov/NCHS/Deaths-by-Race-and-Hispanic-Origin-Ages-0-18-Years/32c3-mvuz

Harvard Global Health Institute
Key Metrics for COVID Suppression: A Framework for Policy Makers and the Public
https://globalepidemics.org/wp-content/uploads/2020/06/key_metrics_and_indicators_v4.pdf

Johns Hopkins – Coronavirus Resource Center
https://coronavirus.jhu.edu/testing/testing-positivity

World Health Organization: Considerations for School-Related Public Health Measures in the Context of COVID-19
https://www.who.int/publications/i/item/considerations-for-school-related-public-health-measures-in-the-context-of-covid-19

* See also State Department of Health websites for updated information on Covid-19 infection rates.