Exploring the Evidence on Virtual and Blended Learning

Prepared by the Research Alliance for New York City Schools, May 2020

These notes provide an evolving overview of research and practical guidance on strategies to implement remote teaching and learning, as well as strategies that combine virtual learning with in-class instruction. The document includes links to a variety of resources and reports on specific strategies and programs. It is important to recognize that this summary is not a complete review of the research literature on the full range of remote and blended learning strategies. It is intended as a work in progress to help inform planning and the assessment of what has worked, what has not worked, for whom, and under what conditions. This document may also inform decisions about how best to organize blended instruction in the event that NYC schools need to phase in the reopening of physical classrooms in 2020-2021.

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Key Resources

- This Rapid Evidence Assessment (April 2020) from the Education Endowment Foundation provides an excellent summary of policy and practice implications from more than 60 studies of remote and blended learning, computer-supported collaborative learning, computer-assisted instruction, and educational games. We highlight several of the key takeaways from this review below.

- The National Network of Education Research-Practice Partnerships (NNERPP) compiled this list of resources (which is being continuously updated) to help school leaders access online information and guidance related to challenges brought about by COVID-19.

- [Strategies for Implementing Personalized Learning While Evidence and Resources are Underdeveloped](#) (2018), published by the RAND Corporation, aims to provide "strategic guidance for designers of personalized learning programs"—drawing on "theory, basic principles from learning science, and the limited research that does exist on personalized learning and its component parts." Key recommendations are highlighted below.

- The [Handbook of Research on K-12 Online and Blended Learning (Second Edition)](#) (2018), published by Carnegie Mellon University, is a lengthy and detailed collection of chapters describing the current state of research in K-12 online and blended learning.

Main Takeaways from the Research Alliance's Review

- There is limited research about online learning, and it is mostly focused on post-secondary and adult education.

- The few studies that do exist in K-12 education find that students participating in online learning generally perform similarly to or worse than peers who have access to traditional face-to-face instruction (with programs that are 100% online faring worse than blended learning approaches) (e.g., see [Means et al. 2013](#); [CREDO 2015](#); [Ahn and McEachin 2017](#)). It is important to note that this research compares online learning with regular classroom instruction—rather than comparing it to no instruction at all.

- Studies of blended learning, personalized learning, and specific technology-based tools and programs provide hints about successful approaches, but also underscore substantial "fuzziness" around the definition of these terms; major challenges to high-quality implementation; and a lack of rigorous impact research.

- The Education Endowment Foundation's [Rapid Evidence Assessment](#) (April 2020) highlights several useful **practice- and policy-relevant lessons** from the limited research available on remote learning. These include:

  - *Teaching quality is more important than how lessons are delivered* (e.g., "clear explanations, scaffolding and feedback"; the evidence suggests few differences between teaching in real time—i.e., "synchronous teaching"—and the "asynchronous" alternatives).

  - *Ensuring access to technology is key*, particularly for disadvantaged students and families.

  - *Peer interactions can provide motivation and improve learning outcomes* (e.g., "peer marking and feedback, sharing models of good work," and opportunities for collaboration and live discussions of content).

  - *Supporting students to work independently can improve learning outcomes* (e.g., "prompting pupils to reflect on their work or to consider the strategies they will use if they get stuck", providing checklists or daily plans).

- *Different approaches to remote learning suit different tasks and types of content* (e.g., "games for learning were found to have a high impact on vocabulary learning in foreign languages, but there is less evidence related to their use in other subjects"; "self-quizzing can help pupils retain key ideas and knowledge, but is not a replacement for other forms of assessment").

- In keeping with these lessons, our review of the evidence suggests a number of **remote learning challenges that NYC schools should anticipate** and work to address:

  - *Issues related to technology capacity*, including not only access to a well-functioning device and a high-quality internet connection, but also the need to provide teachers, parents and students with thorough orientations / training on new tools and basic "help desk" type support. Related to this challenge is the probability that, in the context of remote learning, the "digital divide" will deepen existing educational inequalities.

  - Many studies highlight the risk of *students feeling isolated and disengaged* from peers during remote learning—a problem that seems likely to be aggravated as a result of the Covid-19 shutdown. It will be important to identify practices and structures that help students feel emotionally supported and keep them connected with peers and teachers.

  - Studies also indicate that some *students struggle with having to learn relatively independently* in the context of remote instruction. This includes getting distracted by non-educational activities and becoming frustrated by challenging content.

  - Research underscores that online and personalized learning approaches may require *teachers to embrace a new role and mindset*, focused less on classroom management and more on individualized coaching and support.

What Does the Research Say About Online K-12 Education?

Student Enrollment Patterns and Achievement in Ohio's Online Charter Schools

(2017) by June Ahn and Andrew McEachin

- This study used data from 1.7 million students in Ohio to study "a specific sector of online education: K–12 schools that deliver most, if not all, education online, lack a brick-and-mortar presence, and enroll students full-time."

- Students in the e-schools performed worse on standardized assessments than their peers in traditional charter and traditional public schools.

- As the authors conclude: "One potential but simplistic interpretation is that online schools are unequivocally negative for K–12 learners and policy should deter these school forms. A more nuanced understanding is that **online schools—in its current form as a largely independent learning experience—are not effective for K–12 learners.**

Instead, learners still need the presence of teachers, mentors, or peers to help them through the learning process."

- The lit review in this paper is short, but useful. The authors write:

    "Compared to the parallel literature on the effect of various forms of school choice (e.g., traditional charter schools, vouchers, private schools), there is relatively little research on how online learning works for K–12 students (Barbour & Reeves, 2009). Online learning for K–12 students occurs in a variety of settings such as: students taking an online course or two to supplement offerings at their traditional public school, learners using online courses for credit recovery, students using online tools to complement face-to-face courses, and students fully enrolling in e-schools…. A national evaluation of online charter schools provides the best evidence to date about the impact of online schools on student learning (CREDO, 2015). The study found that students in online charter schools perform significantly worse than students with similar demographics and prior achievement in traditional public schools, often ranging from –.10 *SD* to –.30 *SD*. The study also provides detailed information on the programmatic and curricular differences between online and traditional public schools…. Recent studies of online course taking and online learning in higher education also suggest that students in online settings learn less than students in traditional settings (Hart et al., in press; Heissel, 2016). Furthermore, students in home-based and online charter schools in California in the early 2000s performed worse than their peers in traditional public schools (Buddin & Zimmer, 2005; Gill, Timpane, Ross, Brewer, & Booker, 2007)."

What Have the Transitions to Remote Learning, in Response to the Covid-19 Outbreak, Looked Like?

Studies examining Covid-19-related school closures are just getting underway. The Center for Reinventing Public Education has a widely cited database tracking school district responses to Covid-19, which provides information about 82 districts serving 9 million students (including the NYC DOE).

This new study (May 2020), from the Annenberg Institute at Brown University, offers "a series of projections of COVID-19-related learning loss and its potential effect on test scores in the 2020-21 school year based on (a) estimates from prior literature [on the effects of missing school due to absenteeism, summer breaks, and school closures] and (b) analyses of typical summer learning patterns of five million students [across the U.S]." The authors find that "**students are likely to return in fall 2020 with approximately 63-68% of the learning gains in reading relative to a typical school year and with 37-50% of the learning gains in math**. However, we estimate that losing ground during the COVID-19 school closures would not be universal, with the top third of students potentially making gains in reading."

Currently, the evidence available about successful transitions to remote learning is almost entirely anecdotal. This type of information can provide useful guidance about things that research could look at more systematically. For instance, "Why distance learning is a success in

one California district" (EdSource, April 27, 2020) examines the transition to remote instruction in the Fullerton, CA School District, highlighting "early preparation, quick decision-making to move learning online, and frequent check-ins with students" as keys to success. The article notes:

- The district bought 500 Wi-Fi hotspots for students without internet access, which students picked up from school two days before distance learning was supposed to start.

- Workshops for teachers provided training on how to screen share, send digital assignments, and other features of tools like Google Classroom and Zoom; it was also emphasized that "students' well-being should be the top priority."

- According to the article, "The district originally planned to have live virtual lessons during each class period. But after hearing from students how difficult that would be, the plan switched to give teachers flexibility to decide the time frame and mode of instruction that works best. Many are now doing a mix of live video sessions, pre-recorded lectures, hands-on projects and other ideas as they come up."

- Flexibility has been key: "Platt and other teachers in the district don't require students to be on live video every day. He offers two live sessions a week, and said nearly every student checks in to at least one of those. And he records the sessions for students who can't make it. Many of his students are competing for bandwidth or a quiet spot in their homes, while others… also have to help take care of younger siblings."

- "Another important direction teachers were given: Reduce the curriculum to only the most essential parts that students need to know for the following school year."

- Notably, attendance in this district has been a challenge, in spite of the successes described in the article. Teachers are doing extensive personal outreach to students who haven't been engaged.

What Does the Research Say About Personalized Learning?

Informing Progress: Insights on Personalized Learning Implementation and Effects (2017) by John F. Pane, Elizabeth D. Steiner, Matthew D. Baird, Laura S. Hamilton, and Joseph D. Pane, RAND Corporation

As part of the Next Generation Learning Challenges (NGLC) initiative, with support from the Gates Foundation, this study found that 32 "personalized learning schools" produced small positive affects (about 3 percentile points) on students' math and reading scores.

What is "personalized learning"? The authors write:

"To date, there is no single definition of PL. The research team distilled the following working definition based on conversations with practitioners and experts in the field:

Personalized learning prioritizes a clear understanding of the needs and goals of each individual student and the tailoring of instruction to address those needs and goals.

> *These needs and goals, and progress toward meeting them, are highly visible and easily accessible to teachers as well as students and their families, are frequently discussed among these parties, and are updated accordingly.*

…In a PL classroom, students' learning objectives, pace, and content are likely to vary to a greater extent than they would in a non-PL school…. Technology can play a role in supporting the complexity of the personalization process. When properly supported by teachers, it can help students learn independently and work at their own pace. Technology can also enable educators to take a more personalized approach in their teaching efforts and other activities they undertake to support student learning and development."

This useful [brief, also from John Pane at RAND,](#) (2018) acknowledges both the "lack of evidence" and "considerable enthusiasm about personalized learning among practitioners and policymakers." Pane's brief aims to provide "strategic guidance for designers of personalized learning programs to consider while the evidence base is catching up"—drawing on "theory, basic principles from learning science, and the limited research that does exist on personalized learning and its component parts." The recommendations include:

- *Embrace rigorous empirical evidence where it exists* (e.g., a large body of research finds that "tutoring does not work due to individualization alone. It works due to individualization plus nurturing and attention."—Pane argues that these findings underscore "the value of an approach where students regularly engage with educators, even if technology takes responsibility for some individualization of content and pacing.")

- *Align with principles of learning science* (e.g., see the IES-sponsored [Organizing Instruction to Improve Student Learning](#); also "research gives reason to be wary of some popular ideas in the personalized learning movement, such as the idea that today's learners are digital natives for whom older methods of teaching no longer work, that learning should be matched to a student's learning style, or that students should be given maximum control over what they learn and their learning trajectory").

- *Focus on the productive use of student time and attention.*

- *Maximize the productive use of teacher skill* ("conserve teachers' time and effort for activities that are most directly helpful to students").

- *Use rigorous instructional materials* (leverage the "decades of work (that) have gone into developing rigorous academic standards and aligned instructional materials," including through the Common Core).

- *Monitor implementation and be prepared to adapt*, with a particular focus on equity (e.g., "Careful monitoring… to ensure that students who are working on more-basic material in relation to their grade-level peers are not somehow excluded from learning higher-level material.")

What Does the Research Say about Specific Technology-Based Tools and Programs?

In a nutshell, there is very little rigorous research on the impact of particular tools and programs. Most of the studies we found explore associations between the amount of time students or schools use the tool and their outcomes. While some of these tools appear to be promising, there is a clear need for more rigorous experimental or quasi-experimental research. Below, we highlight findings from studies of several popular tools and platforms:

Khan Academy

- Khan Academy is a nonprofit online platform that offers "practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom." Subjects include math, science, computer programming, and history designed for "all grade levels."

- A WestEd study of the Elevate Math summer program, which provided 19 days of mathematics instruction, consisting of three hours per day in traditional classroom instruction and one hour per day using Khan Academy, found significant improvements in students' math achievement and algebra readiness (vs. a control group that did not have access to the program).

- Other studies highlight correlations between students' use of Khan Academy and positive outcomes, including higher test scores.[1] While some of these studies control for student characteristics and prior achievement, there is a dearth of rigorous experimental evidence about Khan Academy's impact.

- These studies do provide some valuable lessons about implementation challenges and how they were addressed. For example, a report by FSG highlighted challenges related to basic technology capacity and know-how, and the need for teachers to "**shift from their traditional 'sage on a stage' role to act more like coaches, differentiating instruction for each student**." The report emphasized the importance of "starting with a holistic vision of how personalized learning will improve student outcomes, rather than a focus on implementing technology"; "innovating with teachers and administrators to develop context-specific solutions," rather than trying to mandate a one-size-fits-all approach; and ensuring that administrators and IT departments are engaged.

- Another study by SRI (2014) found wide variation in how Khan Academy was implemented. Teachers generally found it to be a useful resource, with 91% reporting that Khan Academy "increased their ability to provide students with opportunities to practice new concepts and skills they had recently learned in class." 80% of teachers reported that Khan Academy "increased their ability to monitor students' knowledge and ability, thus helping to identify students who were struggling." The study also found

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[1] See, for example:
https://cdn.kastatic.org/downloads/2018_LBUSD_Efficacy_Study_Research_Brief.pdf
https://s3.amazonaws.com/KA-share/impact/learning-gets-personal.pdf
https://s3.amazonaws.com/KA-share/impact/khan-academy-implementation-report-2014-04-15.pdf

positive relationships between Khan Academy use and "better-than-expected achievement and nonachievement outcomes, including level of math anxiety and confidence in one's ability to do math."

Zearn

- Zearn is a nonprofit online math program used by 1.5 million elementary students across the U.S.

- Several studies conducted and published by Zearn show links between usage and improved math scores. This includes a study in NY State that found larger improvements for schools with high proportions of English learners and students receiving free and reduced price lunch.

- This recent study by researchers at Johns Hopkins examined the use of Zearn in 15 elementary schools in a "large urban school district" in NY State. The study documented positive perceptions of Zearn among teachers and students, but highlighted variation in implementation, including the fact that many schools did not meet weekly usage guidelines. Interviews suggested the need for more consistent and timely teacher PD. Teachers and administrators felt strongly that Zearn had increased students' engagement and motivation in math. Regression-adjusted test scores were similar for treatment and control group students. Increased usage (i.e., time on Zearn and lessons completed) were associated with better test scores.

School of One / Teach to One

- School of One (SO1)—now known as Teach to One—is an individualized, technology-enhanced math instructional program.

- The Research Alliance's 2012 study found that SO1 produced a mix of positive, negative and neutral results across schools and grade levels. Differences in SO1 impacts across subgroups of students did not follow a discernible pattern that would suggest SO1 was reliably more effective for some students and not for others. Exploratory analyses found that, for students who start off at low performance levels, exposure to on-grade-level skills in SO1 was associated with improvements on state test scores.

- A more recent federally funded evaluation of Teach to One (2018) in Elizabeth, NJ middle schools found a great deal of variation in both program implementation and outcomes, with no overall impacts on student achievement.

Summit Learning Program

- This personalized learning program was developed by a network of charter schools in California and Washington, and has received substantial investment from Facebook and the Chan Zuckerberg Initiative (which has provided funds totaling $142 million since 2016).

- It is now being used by about 84,000 students in nearly 400 schools, across 40 states.

- It is notable that Summit Learning was designed as a "comprehensive personalized learning approach"—not "a remote learning solution"—although the Hechinger Report has found that many of the "schools that have most deeply embraced the model in their buildings have found it to be surprisingly transferrable." (This piece from Hechinger Report provides a lot of interesting information about the Summit model and highlights its varied implementation across schools.)

- While Summit describes the model as "evidence-based," there appear to be no rigorous studies of the program's impact. (A 2019 Chalkbeat article reported that Summit worked with researchers at Harvard to plan an evaluation, but it was never carried out.)

- This study from Johns Hopkins University found "significant problems in the use of the Summit Learning Platform":

  "When we observed students using Summit, they were not engaged with the software in optimal ways. Instead of watching videos or reading tutorial texts, students went straight to the exam and attempted to answer questions. When they answered incorrectly, corrective text popped up, which students did read; they then tried again with the next question. Even if students progressed according to plan, their learning would be limited to how to answer problems in the format presented by the Summit exam… The lack of teacher surveillance of student progress in some Summit classrooms meant that students worked very slowly through the material…. Off-task student behavior was the same as, or worse than, in the more traditional classrooms, with some students observably working on assignments from other classes, viewing YouTube videos (or similar), queuing songs on playlists, toggling between Summit and entertainment websites, or pausing on work screens while chatting with neighbors."

Questions for Future Research

The evidence described above—and New York City's experiences to date with remote learning—raise important questions that the Research Alliance is eager to examine in collaboration with the NYC Department of Education and other partners. These questions include:

- Are there particular trainings or other types of support for teachers that have facilitated a smoother transition to remote learning?

- What practices, structures, or strategies are schools and teachers using to overcome challenges associated with remote learning? e.g., How are schools ensuring that students have access to technology and "tech support" needed for remote instruction? How are schools promoting student engagement and attendance? (And how are they defining "attendance" under the circumstances?) How are teachers differentiating instruction, and are there ways in which remote learning has actually facilitated more personalized support? How are teachers and other school staff attempting to meet students' social and emotional needs?

- Which students and schools have lost the most ground relative to their recent academic trajectories? This information will be important both to identify those in need of extra support and, longer term, to assess the impact of Covid-19 on students, schools, and communities. Research should attempt to discern conditions and practices that supported effective remote instruction. For example, did students who received a device early on have greater learning gains—or less learning loss—compared with students who received a device later? Did students who were directly contacted (or contacted more frequently) by a teacher, social worker, or parent coordinator have greater levels of engagement in online learning or less learning loss than other similar students?

- To what extent were non-core academics (e.g., art, music, gym) included in remote learning? Was greater "coverage" of subjects associated with any differences in student engagement or achievement?

- Was the use of particular online learning tools (e.g., Zearn, Flocabulary) or methods (e.g., live or recorded video of the teacher) associated with better outcomes for different kinds of students?

For More Information

Please feel free to contact us at:
- research.alliance@nyu.edu
- Facebook: www.facebook.com/ranycs / Twitter: @RANYCS