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ONLINE LEARNING: HOW DO BRICK AND MORTAR SCHOOLS STACK UP TO VIRTUAL SCHOOLS?

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Executive Summary

The Covid-19 pandemic forced many American schools to hastily transition to online learning. I assess how the online learning experience of students enrolled in brick and mortar schools that transitioned to online learning in Spring 2020 compared to the experience of students who were already enrolled in virtual schools when the pandemic began. Absent formal assessments to quantify learning loss, such comparison can help contextualize the performance of brick and mortar schools in their transition to online learning. Moreover, comparison informs how policy can promote higher-quality online schooling, a burgeoning policy concern amidst widespread school closures forecasted for the 2020-2021 academic year.

I hypothesize that, owing to experience and expertise, virtual schools provided a higher quality education than did brick and mortar schools operating online. I test this hypothesis by administering surveys to parents of students enrolled in virtual schools. When applicable, parents also complete a survey about the online learning experience of siblings enrolled in brick and mortar schools that switched to online learning in Spring 2020. I compare survey outcomes across four constructs which research indicates are critical to successful online learning: active learning, communication, pedagogical efficacy, and classroom management.

Overall, I observe that virtual schools earned substantially higher marks across the four constructs. Parents were significantly more likely to report that their child engaged in activities associated with active learning, and they agreed that virtual schools outperformed brick and mortar schools when it comes to clear communication, classroom management, and sound instructional practices. On the three indexes for which I derive a composite index score-communication, classroom management, and sound instructional practices-virtual schools outperformed brick and mortar schools by more than one standard deviation.

One question within the pedagogical efficacy construct simply asks whether parents feel that their children learned a lot. The responses were more divergent according to school sector than any agree/disagree question in the survey. Whereas 86.4% of respondents agreed or strongly agreed that their children in virtual schools “learned a lot,” only 13.4% of respondents of brick and mortar students agreed or strongly agreed that their children learned a lot. The radically divergent responses to that question highlight that learning is, to some extent, a function of all the items on this survey. Students in virtual schools plausibly learned more because they benefited from higher quality instruction, better classroom management, clearer communication, and more frequent active learning.

I examine differences in responses by racial groups and school sector (i.e. traditional public, charter school, or private school) to assess concerns that school closures could exacerbate socioeconomic achievement gaps. Overall, I observe mixed evidence. Private schools, which are cost-prohibitive for many families, earn higher marks than public schools. On the other hand, Hispanic and African American parents report a better online learning experience in brick and mortar schools than do white or Asian parents. Moreover, charter schools, which disproportionately serve students of color and underprivileged students, earned higher marks than traditional public schools for their handling of online learning.

When it comes to drawing policy conclusions, some limitations apply. First, data was collected from parents of students enrolled in schools affiliated with K12 Inc. Though K12 Inc. is the largest provider of online primary and secondary education, it is unclear to what extent schools affiliated with K12 Inc. are representative of the virtual schooling sector. In other words, it is not clear to what extent survey results reflect differences between brick and mortar schools and K12 Inc.-affiliated schools or between brick and mortar schools and the universe of virtual schools. Second, it remains to be seen to what extent brick and

mortar schools might improve their virtual instruction during the 2020-2021 academic year. Depending on when schools or districts announced their reopening plans, teachers would have only had weeks or months to prepare for online instruction. Still, weeks or months of preparation is an improvement over the hasty closings which occurred in Spring 2020. Finally, while one expects that survey results are correlated with student achievement—the outcome that conventionally guides education policymaking—the strength of that correlation is unclear.

Caveats notwithstanding, the magnitude of differences in survey responses almost certainly indicate that students in virtual schools learned more than students in brick and mortar schools operating virtually. The magnitude of difference in learning may shrink, though is unlikely to disappear, during the current academic year. Consequently, in the interest of student learning, states should not cap, and should perhaps seek to expand access to virtual schools, at least through the course of pandemic-related school closures.

Introduction

Thousands of American schools shuttered their doors during the second half of the 2019-2020 school year due to the Covid-19 pandemic. Most schools that closed their physical campus switched to online learning to conclude the school year. Brick and mortar schools uninitiated to online learning were tasked with adapting teaching practices to a different modality with almost no training or experience to call upon. While anecdotal accounts indicate that some schools achieved remarkable success in transitioning to distance modalities of learning, many others schools struggled to keep students and teachers engaged in the learning process.

There is great urgency in assessing the overall efficacy with which brick and mortar schools executed online learning. Many American schools are beginning the 2020-2021 academic year with virtual or blended models of schooling, while countless others scheduled to open will inevitably transition to virtual or blended learning as public health concerns mount.

Difficulties in transitioning to online learning elevate concerns about national competitiveness. A comparatively greater number of schools in other developed regions of the globe (e.g. Europe and East Asia) are poised to begin the 2020-2021 school year in person, and are perhaps likelier to sustain in-person activities due to a lower incidence of Covid-19 among the general population. If American brick and mortar schools struggle in their delivery of online education, the human capital stock of Generation Z and Generation Alpha could languish compared to other developed nations (Psacharopoulos et al., 2020).

Difficulties in transitioning to online learning also elevate concerns about equity. Privileged families unsatisfied with the virtual learning experience delivered by their public schools paid for alternatives, including private schools, microschools, or learning pods. Others homeschooled their children, an option with limited direct cost but potentially high opportunity cost (i.e. loss of parental income).

For some families who pursued alternatives to their residentially assigned public school, the chief impetus was a concern that virtual education cannot replicate in-person schooling in terms of academic effectiveness or that it could not adequately meet the social-emotional needs of their children. For others, perhaps, the concern was not the modality of schooling itself but the quality of instruction offered by the school, as evidenced by strong demand for established virtual schools (Tanner, 2020; Associated Press, 2020).

Though some scholars question the wisdom and limitations of online education, expanded utilization appears to be a foregone conclusion. In the short run, millions of families will utilize virtual education

due to safety concerns surrounding Covid-19 or resource constraints which compel them to enroll in a school operating virtually, even if it is not their preference. In the long run, it is likely that a non-negligible number of families compelled to participate in virtual schooling will discover that it better meets the needs of their child (Schroeder, 2020), and they will enroll in virtual schools regardless of the broader public health situation. Indeed, a survey conducted in May 2020 found that 73% of parents would be willing to have their children take at least some high school courses online, a 17-percentage point increase from 2009 (Henderson et al., 2020).

Methods

The recency of Covid-19 and dearth of formal assessments administered since schools closed renders impossible a causal evaluation of learning loss incurred by students enrolled in brick and mortar schools that switched to online learning during the 2019-2020 school year. Nevertheless, given the volume of students who will experience at least some online learning during the 2020-2021 school year, there is an urgent demand to understand as best as possible what went well and what did not go well after brick and mortar schools switched to online learning.

I offer preliminary evaluation of how schools handled the transition to online learning by comparing the online learning experience of students enrolled in brick and mortar schools that switched to online learning during the 2019-2020 school year to students who were enrolled in virtual schools before the pandemic struck. While online schools have faced scrutiny for their performance, their years of institutional knowledge, expertise, and virtual learning infrastructure should in theory make them more adept than brick and mortar schools at delivering virtual instruction. So while this study does not weigh in—philosophically or empirically—about the overall effectiveness of online schooling compared to in-person schooling, it offers a first glimpse at how well brick and mortar schools handled virtual learning compared to established virtual schools.

Two anonymous surveys were administered to parents of children enrolled in school powered by K12, a provider of online schooling and curricula. One survey asks parents to reflect on the experience of their child enrolled in a virtual school; the other asks them whether they have children who were enrolled in brick and mortar schools during the 2019-2020 academic school year and, when applicable, to reflect on their experience with virtual learning through that brick and mortar school. 99,826 surveys were deployed, of which 10,144 were answered (10.1% response rate). 61% of submitted surveys were completed on behalf of students enrolled in virtual schools. The remainder were completed on behalf of students enrolled in brick and mortar schools that switched to online instruction. Two thirds of respondents identified their child as white whereas 13% identified themselves as African American, 13% as Hispanic or Latino, and 2% as Asian. The demographic composition of the sample mirrors the national demographic composition of virtual school students (Molnar, 2019).

Ordinal questions prompt respondents to assess the degree to which they agree with a statement (1, Strongly disagree; 2, Disagree; 3, Somewhat disagree; 4, Neither agree nor disagree; 5, Somewhat agree; 6, Agree; 7, Strongly agree) or the frequency with which an event occurred (1, Never; 2, Once per month or less; 3, A couple times per month; 4, About once per week; 5, More than once per week). Respondents were also given the option of responding that they were uncertain of their response to a question. Uncertain responses are coded as missing data. Questions are assigned to one of *four* constructs. Those constructs, the questions that comprise them, and Cronbach's alpha coefficients are displayed in Table One. Overall, the constructs display a high level of internal consistency.

Table One: Virtual Learning Constructs

Active Learning (Response Scale: Frequency)

Item	Alpha
Instructors assigned group projects and/or team-based tasks	.84
Instructors required students to participate in discussion forums (either written or spoken)	.84
Instructors required students to share their work with other students to receive feedback	.79
Instructors provided opportunities for students to present their work to the entire class	.82
Test Scale	.86

Communication (Response Scale: Agreement)

Item	Alpha
Instructors set clear academic standards	.94
Instructors provided timely feedback to students on completed work (e.g. papers or tests)	.90
Instructors made themselves available to help my child/children outside of classroom hours	.90
Instructors answered my calls, texts, or emails in a timely fashion	.90
Accessing course materials was easy and straightforward	.91
Test Scale	.91

Pedagogical Efficacy (Response Scale: Agreement)

Item	Alpha
Instructors motivated students to do their best	.96
Instructional materials worked well for learning in an online/virtual setting	.95
I feel like my child learned a lot	.95
Instructors motivated students to care about what they were learning	.95
Instructors taught new material rather than simply review old material	.96
Test Scale	.96

Classroom Management (Response Scale: Agreement)

Item	Alpha

Instructors were skilled at preventing and managing disruptions in the virtual classroom	.94
The pace of learning was well-suited to the needs of my child	.94
Attendance and participation were expected and tracked	.95
There was a clear learning plan for each week	.94
Instructors demonstrated competency with operating virtual classroom software	.94
Test Scale	.95

Results and Discussion

I hypothesize that virtual schools would outperform brick and mortar schools in their delivery of online education. The specific purpose of this study is to glean the magnitude of that advantage and assess relative strengths and weaknesses by surveying parents to assess efficacy within four constructs that research indicates are critical to successful virtual education. Overall, the survey results indicate that virtual schools significantly outperformed brick and mortar schools on each index and all items which comprise the index. Differences in outcomes on all items are statistically significant at the 99% confidence level.

Active Learning

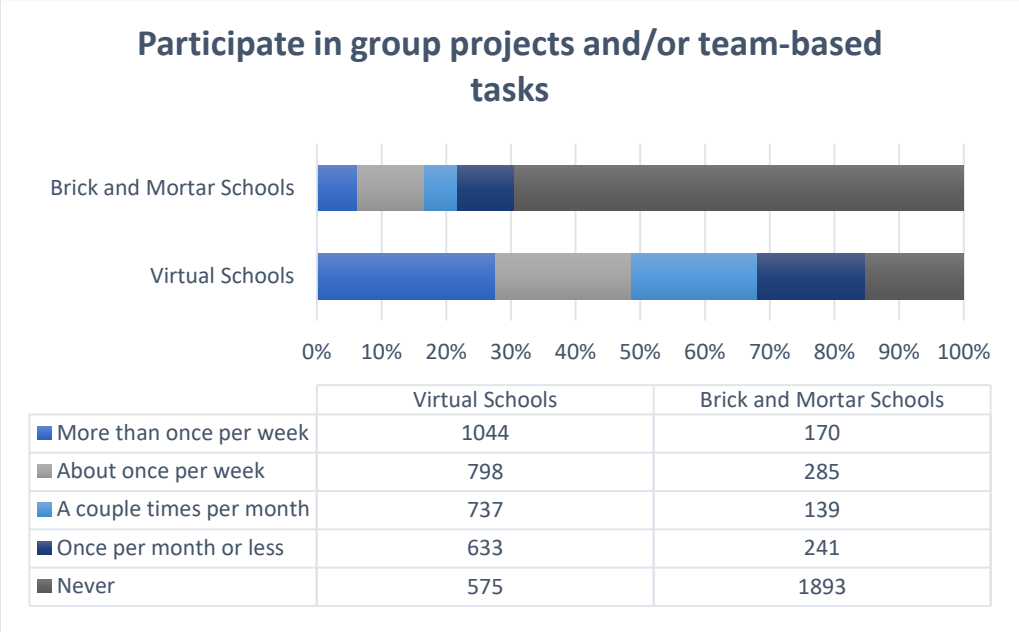
Active learning entails encountering new information or ideas, engaging with them, and reflecting on what was learned (Fink, 2003). A meta-analysis of studies conducted on active learning indicates that it is associated with stronger learning outcomes compared to transmissionist approaches in which teachers impart knowledge which students are tasked with absorbing (Freeman et al., 2014).

Active learning is especially important for successful distance learning. Nummenmaa & Nummenmaa (2008) observe a link between evaluations of online courses and the degree of interactivity demanded by the course. That is, students have stronger appraisals of online courses which, per Moore's (1989) typology, leverage learner-content interaction, learner-instructor interaction, and learner-learner interaction.

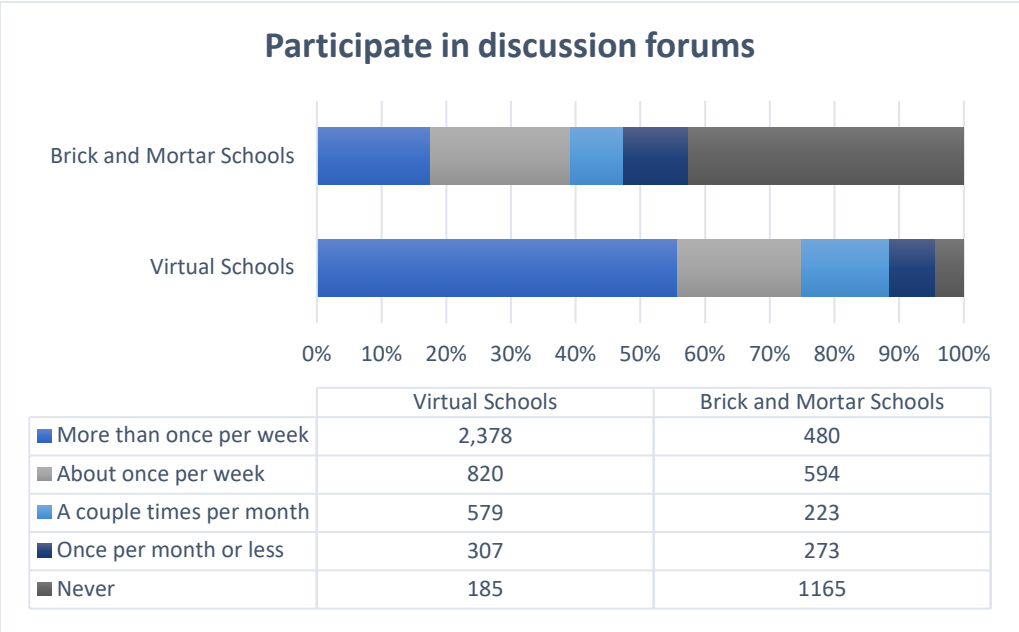
Interaction, the process of reciprocal communication or exchange, improves learning through two non-mutually exclusive channels. First, transactional distance theory holds that the sense of obligation that learner and teacher feel toward one another is closely linked to the frequency and duration of their interactions. To that end, interaction can make the learner more invested in their own learning, thereby increasing effort. Second, the social-constructivist view of learning posits that interaction with peers, especially those of high intelligence and diverse backgrounds, is foundational to cognitive development.

Preliminary evidence suggests that active learning—which is achieved largely through the three types of interactions in Moore's typology—was deficient in many schools that switched to virtual instruction during the 2019-2020 school year. For example, media accounts indicate that some teachers simply assigned work packets for students to complete but were otherwise largely unengaged in the learning process (Kamenetz, 2020). The parents polled for this survey corroborate the notion that brick and mortar schools mostly neglected the active learning process. Indeed, certain results are both striking not only in

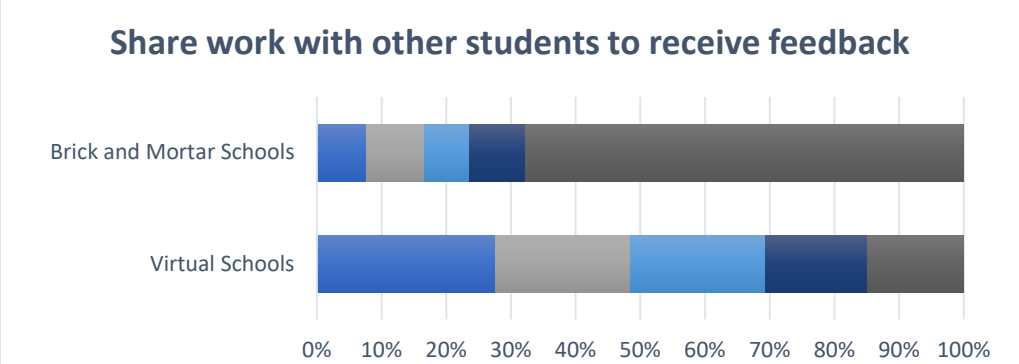
their comparison to virtual schools but in absolute terms. For example, 69.4% of parents reflecting on the experience of their children in brick and mortar schools report that their children were never tasked with participating in group projects or team-based tasks. A similar percentage of parents of virtual school students reported that their children participated in group projects or team-based tasks at least a couple times per month.



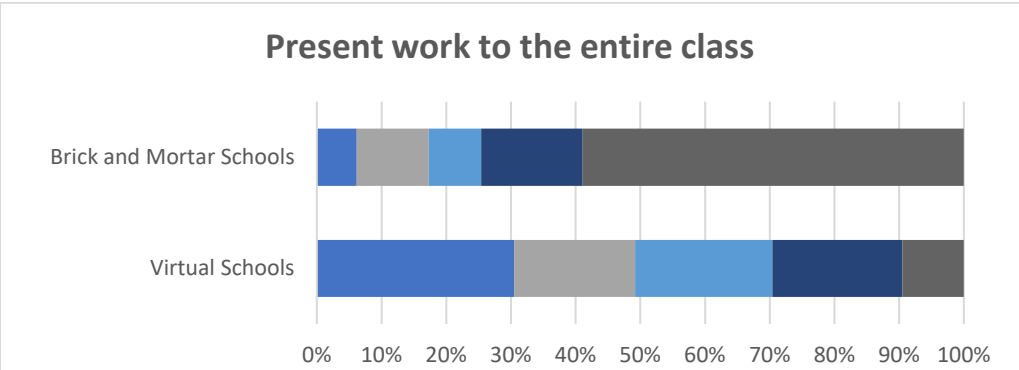
	Virtual Schools	Brick and Mortar Schools
More than once per week	1044	170
About once per week	798	285
A couple times per month	737	139
Once per month or less	633	241
Never	575	1893



	Virtual Schools	Brick and Mortar Schools
More than once per week	2,378	480
About once per week	820	594
A couple times per month	579	223
Once per month or less	307	273
Never	185	1165



	Virtual Schools	Brick and Mortar Schools
More than once per week	1015	204
About once per week	768	241
A couple times per month	764	187
Once per month or less	582	231
Never	548	1810



	Virtual Schools	Brick and Mortar Schools
More than once per week	1145	165
About once per week	700	299
A couple times per month	796	218
Once per month or less	755	421
Never	356	1583

Overall, 39.5% of respondents with children enrolled in brick and mortar schools that switched to online learning report that their children never participated in any of the activities which comprise the active learning construct, whereas 2.1% of virtual school parents report that their children never participated in such activities. Meanwhile, 46.1% of respondents reported that their children in brick and mortar schools did not participate in any of the four activities more than a couple times per month, whereas 4.5% of respondents make the same claim about children enrolled in virtual schools

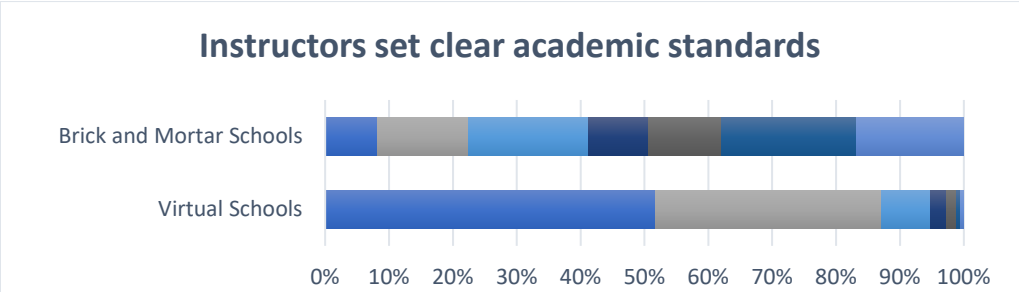
Note that I do not tabulate a composite index score for this construct, as the responses offered to the questions in the active learning construct are not quantitatively equal in their magnitude of difference from one another. I elected for precisely defined frequency responses rather than Likert-scale responses because Likert-scale responses are vague and difficult to interpret when they address event frequency.

Communication

Clear communication from teachers to students and parents can pose challenges in a virtual format, which demands different skills and practices from clear communication in a traditional face-to-face format. Ensuring that students are clear on learning expectations presents a challenge for teachers accustomed to meeting with students in person several days per week (Isman et al., 2003). Moreover, the challenge of establishing and maintaining clear communication between teachers and families might be exacerbated by anxiety and concomitant loss of focus experienced by many through the course of the Covid-19 pandemic (Canle, 2020). Challenges notwithstanding, student perceptions of teacher communication are critical to student learning within distance schooling modalities, and unclear expectations are specifically cited as a common source of frustration (So & Brush, 2008).

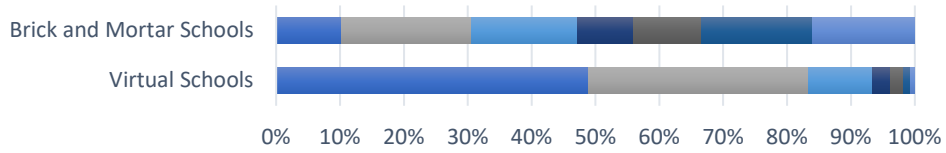
Quality of communication from instructors to students and parents is critical to successful online learning. Teachers must be clear in their expectations for student work and conduct during synchronous sessions and "must establish the purpose of assessment, the criteria being measured, and the intended outcomes before meaningful assessment methods can be achieved." (Gaytan & McEwen, 2007, p. 118). Quantity of communication matters, too. Teachers must respond to student inquiries in a timely fashion to overcome transactional distance and practical limitations imposed by the absence of face-to-face interaction. For that reason, some virtual schools require that teachers respond to all e-mails and phone calls within 24 hours (Watson et al., 2009).

The virtual learning construct asks whether instructors answered phone, text, or email inquiries in a timely fashion, and whether instructors were accessible outside of classroom hours. It also gauges communication across key stages in the teaching process, including whether instructors set clear academic standards, whether course materials were easy to access, and whether they provided timely feedback on student work.



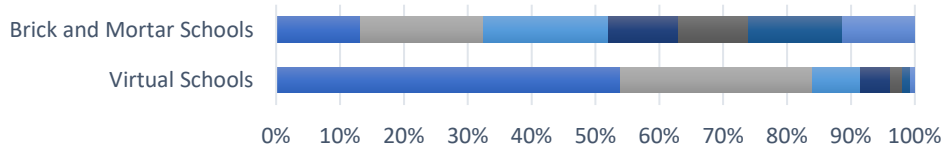
	Virtual Schools	Brick and Mortar Schools
Strongly agree	2568	239
Agree	1756	419
Somewhat agree	380	550
Neither agree nor disagree	126	276
Somewhat disagree	75	339
Disagree	31	618
Strongly Disagree	25	493

Instructors provided timely feedback on completed work

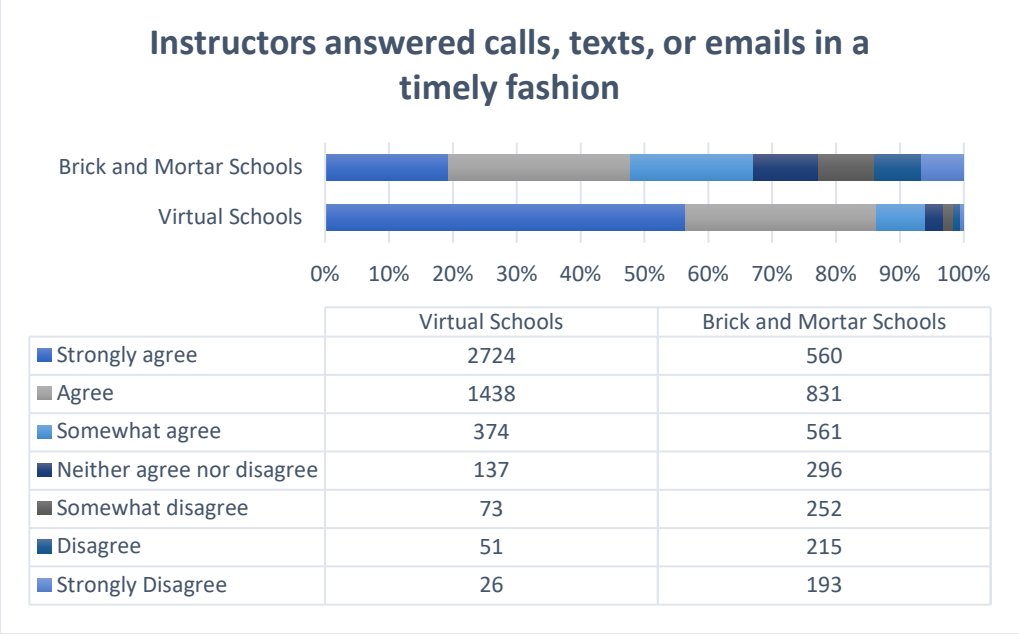


	Virtual Schools	Brick and Mortar Schools
Strongly agree	2363	295
Agree	1668	594
Somewhat agree	485	482
Neither agree nor disagree	133	252
Somewhat disagree	104	313
Disagree	53	504
Strongly Disagree	30	464

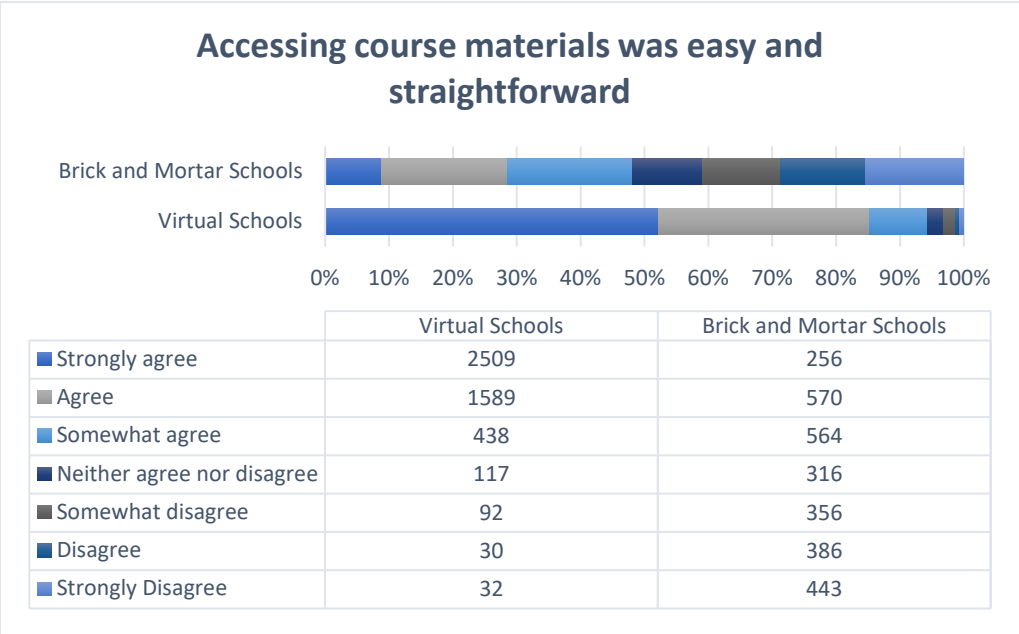
Instructors made themselves available to help outside classroom hours



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2609	386
Agree	1452	561
Somewhat agree	369	572
Neither agree nor disagree	229	316
Somewhat disagree	87	319
Disagree	58	429
Strongly Disagree	36	332



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2724	560
Agree	1438	831
Somewhat agree	374	561
Neither agree nor disagree	137	296
Somewhat disagree	73	252
Disagree	51	215
Strongly Disagree	26	193



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2509	256
Agree	1589	570
Somewhat agree	438	564
Neither agree nor disagree	117	316
Somewhat disagree	92	356
Disagree	30	386
Strongly Disagree	32	443

TABLE TWO: COMMUNICATIONS INDEX STATISTICS

	Virtual Schools	Brick and Mortar Schools
25TH PERCENTILE	6	3
50TH PERCENTILE	6.40	4.20
75TH PERCENTILE	7	5.40
MEAN	6.30	4.14
STANDARD DEVIATION	0.87	1.55

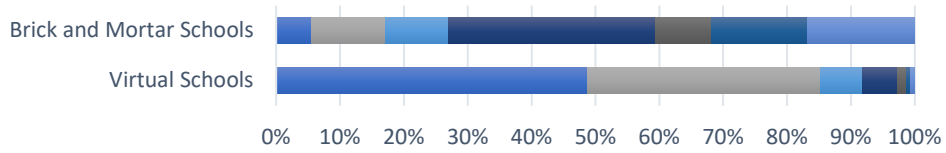
All told, parents evaluating the clarity and frequency of communications from instructors to students and families give considerably higher marks to virtual school staff. The average communications score for virtual schools is 6.3, and the median is 6.4, indicating that parents typically fall in the range of either agreeing or strongly agreeing that communication was clear and frequent. Parents of brick and mortar students who received virtual instruction receive an average score of 4.1 and a median score of 4.2, scores that fall closer to neutrality than modest agreement. Unsurprisingly, there was also greater variation in how the parents of brick and mortar students evaluated communications. Whereas the virtual school communications index score has a standard deviation of .87 points, the brick and mortar index score has a standard deviation of 1.55 points. Consequently, virtual schools in the 25th percentile receive an overall score of 6, indicating agreement with clear and frequent communication. Meanwhile, brick and mortar schools in the 25th percentile earn a score of 3, indicating that parents "somewhat disagree" that communication was effective.

Classroom Management

In devising a conceptual model for virtual classroom management, Rufai, Alebiosu & Adeakin (2015) begin by stating, "The primary purpose of teaching is to impact knowledge. However, two factors can facilitate this objective. One is having a simplified and well explained course material and the other is ensuring its effective delivery. A well-managed classroom will guarantee effective delivery." (p. 27). While this perhaps overstates the importance of classroom management—indeed, a teacher can employ pedagogically unsound practices in an otherwise well-managed classroom—it highlights that classroom management—"the act of supervising relationships, behaviors, and instructional settings and lessons for communities of learners" (Iverson, 2003, p. 4)—is a necessary (if insufficient) condition for student growth within virtual and in-face schooling modalities.

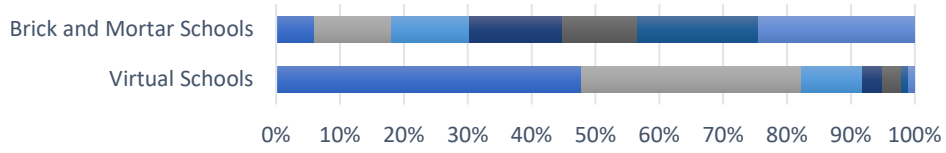
The classroom management construct contains questions about the skill with which instructors prevented disruptions during synchronous instruction, as there were many accounts of students or unwanted visitors disrupting learning, or even sharing lewd content during Zoom sessions (Stevens, 2020). The construct also asks about pace of learning. Depending on design, distance learning can empower students to learn at their own pace, but to what degree this occurred in brick and mortar schools that closed down is unclear. Finally, the construct gauges whether attendance and participation were tracked, whether teachers had a clear learning plan for each week, and whether instructors demonstrated competency with virtual classroom software.

Instructors were skilled at preventing and managing disruptions



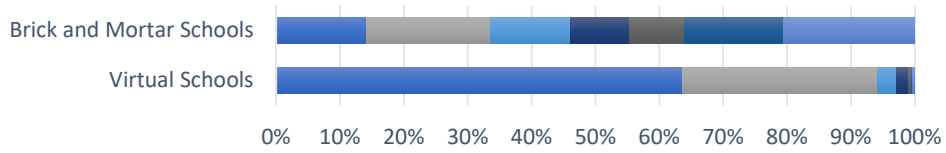
	Virtual Schools	Brick and Mortar Schools
Strongly agree	2351	160
Agree	1760	338
Somewhat agree	317	286
Neither agree nor disagree	264	941
Somewhat disagree	65	254
Disagree	33	436
Strongly Disagree	32	487

The pace of learning was well-suited to the needs of my child



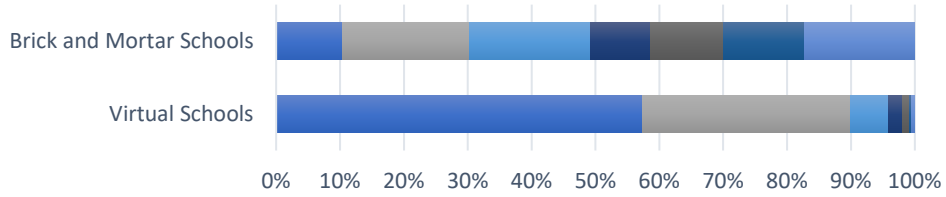
	Virtual Schools	Brick and Mortar Schools
Strongly agree	2297	173
Agree	1653	347
Somewhat agree	459	356
Neither agree nor disagree	147	421
Somewhat disagree	144	340
Disagree	57	547
Strongly Disagree	45	706

Attendance and participation were expected and tracked

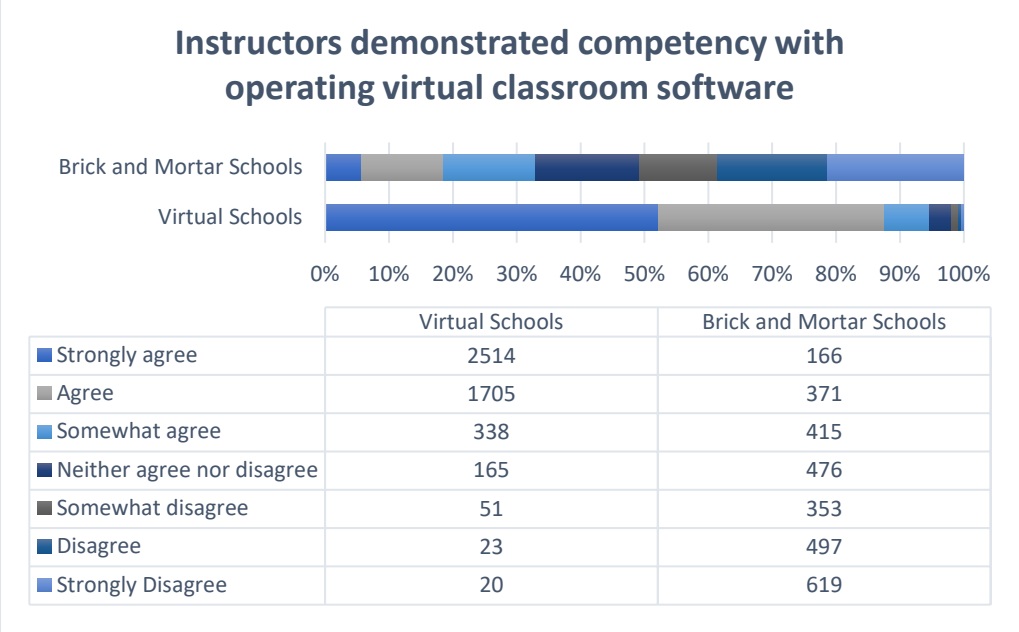


	Virtual Schools	Brick and Mortar Schools
Strongly agree	3057	412
Agree	1474	559
Somewhat agree	138	367
Neither agree nor disagree	89	265
Somewhat disagree	24	250
Disagree	11	452
Strongly Disagree	16	595

There was a clear learning plan for each week



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2763	300
Agree	1566	579
Somewhat agree	290	549
Neither agree nor disagree	99	272
Somewhat disagree	54	331
Disagree	17	364
Strongly Disagree	25	502



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2514	166
Agree	1705	371
Somewhat agree	338	415
Neither agree nor disagree	165	476
Somewhat disagree	51	353
Disagree	23	497
Strongly Disagree	20	619

TABLE THREE: CLASSROOM MANAGEMENT INDEX STATISTICS

	Virtual Schools	Brick and Mortar Schools
25TH PERCENTILE	6	2.40
50TH PERCENTILE	6.40	3.60
75TH PERCENTILE	7	4.80
MEAN	6.32	3.66
STANDARD DEVIATION	0.79	1.56

Parents give strong marks to virtual school teachers for their managing of a virtual classroom. On average, parents agree to strongly agree that classrooms were skillfully managed, and three quarters either agree or strongly agree with that premise. Parents are less bullish on how classroom management was handled in brick and mortar schools. On average, parents express neutrality to modest disagreement with the notion that online classrooms were well-managed. Unsurprisingly, while the superior assessments of classroom management in virtual schools is significant on all items within the construct, it is primarily driven by perceived competency with managing virtual classroom software, a phenomenon likely explained by pronounced asymmetries in software experience and expertise between virtual school teachers and brick and mortar teachers.

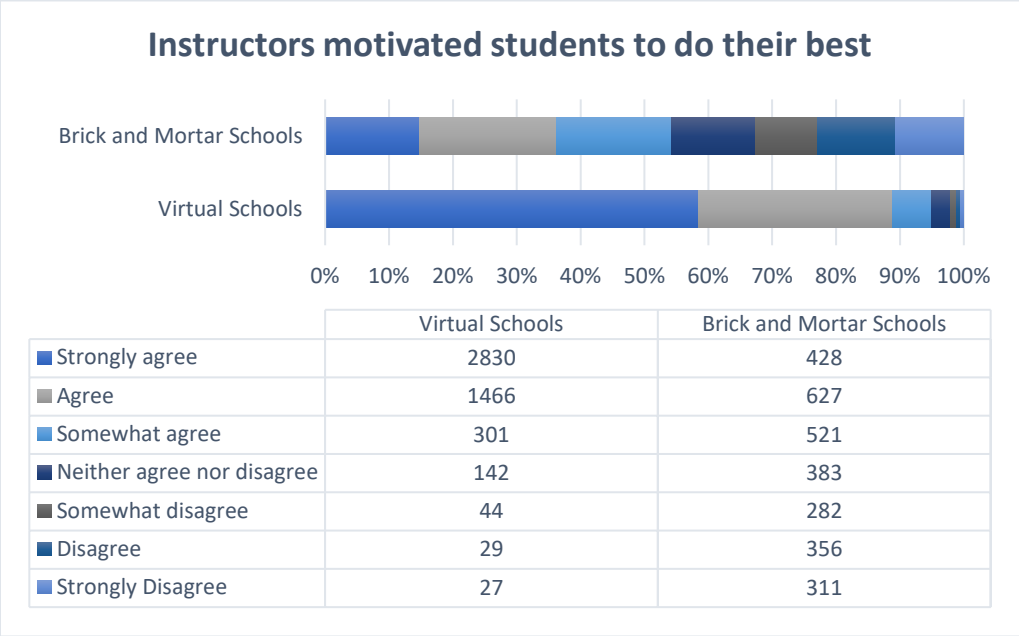
Pedagogical Efficacy

Ultimately, virtual schools are judged according to the same criterion upon which other schools are judged: Chiefly, to what extent did the school produce knowledge and skill acquisition? A 2004 meta-analysis analyzing the effects of web-delivered K-12 programs vis-à-vis academic outcomes concludes that, on average, virtual schools are indistinguishable from brick and mortar schools in the degree to which they produce gains in student achievement (Cavanaugh et al., 2004). A more recent Department of

Education-sponsored meta-analysis authored by Means et al. (2009) concludes that online learning is modestly more effective than in-person learning, but the study cautions that there are a limited number of studies from K-12 education, and only five qualify as experimental or quasi-experimental. Moreover, "In many of the studies showing an advantage for online learning, the online and classroom conditions differed in terms of time spent, curriculum and pedagogy…the studies in this meta-analysis do not demonstrate that online learning is superior as a medium." (Means et al., 200, XVII).

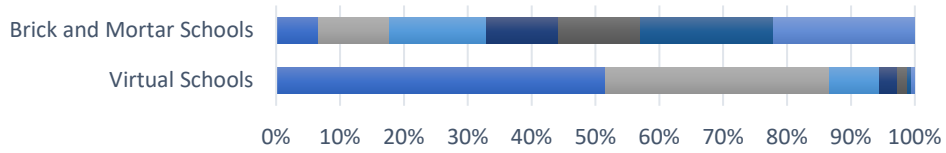
Both meta-analyses illustrate significant variation in effect sizes among different programs, so meta-analytic averages can obfuscate the fact that virtual school programs sometimes perform significantly better and sometimes significantly worse than in-person programs. Miron & Urschel (2012) attempt to gauge where K12 Inc.-operated schools fall within this distribution of outcomes and conclude that performance indicators indicate weak performance. However, Chingos (2013) criticizes their conclusions because they rely upon achievement data rather than growth data. Such data is more instructive about the characteristics and demographics of students enrolled in a school than it is about the quality of the school itself. Unfortunately, then, comparison between K12 Inc.-affiliated virtual schools and brick and mortar schools cannot directly inform the degree to which student learning in the latter was impacted by the switch to virtual learning. Again, I emphasize that the purpose of this endeavor is to compare student experiences between the virtual schooling sector and the brick and mortar sector operating virtually.

To date, no assessment data has been collected subsequent to campus closures. Right now, then, the most instructive data comes from assessments and comparisons across sectors (brick and mortar versus virtual) of pedagogical efficacy. That is, to what extent did teachers succeed in promoting student cognitive development and knowledge acquisition? The learning efficacy construct assesses this question first and foremost by asking parents whether they feel their children learned a lot. It also inquires whether teachers covered new material—state guidance varied widely on this matter (Schwartz, 2020)—whether teachers motivated students to care about their learning (Theobald, 2006), and whether instructional materials were well-suited for virtual learning.



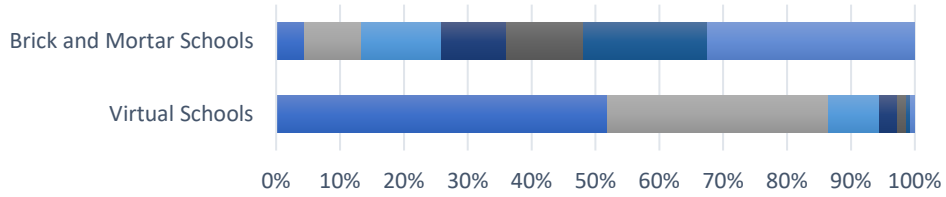
	Virtual Schools	Brick and Mortar Schools
Strongly agree	2830	428
Agree	1466	627
Somewhat agree	301	521
Neither agree nor disagree	142	383
Somewhat disagree	44	282
Disagree	29	356
Strongly Disagree	27	311

Instructional materials worked well for learning in an online/virtual setting

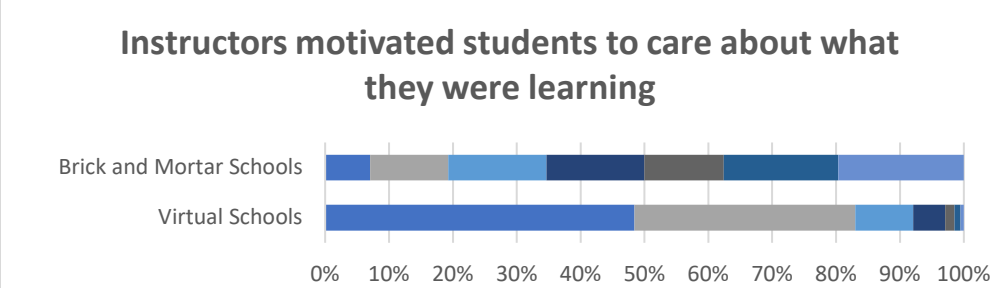


	Virtual Schools	Brick and Mortar Schools
Strongly agree	2491	192
Agree	1696	324
Somewhat agree	382	441
Neither agree nor disagree	134	329
Somewhat disagree	77	372
Disagree	29	602
Strongly Disagree	27	644

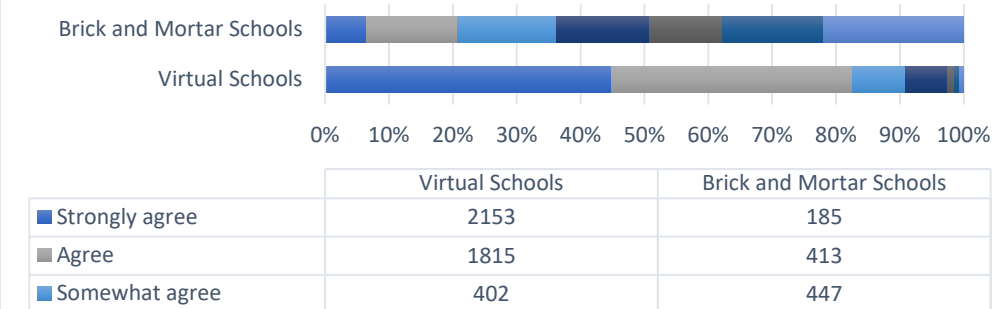
I feel like my child learned a lot



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2498	131
Agree	1660	257
Somewhat agree	383	365
Neither agree nor disagree	136	292
Somewhat disagree	72	350
Disagree	30	564
Strongly Disagree	32	944



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2342	204
Agree	1670	355
Somewhat agree	439	447
Neither agree nor disagree	242	445
Somewhat disagree	72	361
Disagree	44	520
Strongly disagree	26	571



	Virtual Schools	Brick and Mortar Schools
Strongly agree	2153	185
Agree	1815	413
Somewhat agree	402	447
Neither agree nor disagree	315	419
Somewhat disagree	53	329
Disagree	39	456
Strongly Disagree	30	634

TABLE FOUR: PEDAGOGICAL EFFICACY INDEX STATISTICS

	Virtual Schools	Brick and Mortar Schools
25TH PERCENTILE	6	2.20
50TH PERCENTILE	6.40	3.40
75TH PERCENTILE	7	4.80
MEAN	6.30	3.55
STANDARD DEVIATION	0.86	1.62

Assessments of the pedagogical efficacy of virtual schools almost mirror the results for communication. That is, three-quarters of parents either agree or strongly agree that teachers employed instructional

practices that were conducive to student learning. Assessments from brick and mortar parents, however, appear unremarkable. On average, parents report somewhere between neutrality and modest disagreement with the premise that instructional practices were conducive to learning.

One item within the construct deserves particular attention. A question asks whether parents feel that their children learned a lot. The responses were more divergent according to school sector than any agree/disagree question in the survey. Whereas 86.4% of respondents agreed or strongly agreed that their children in virtual schools "learned a lot," only 13.4% of respondents of brick and mortar students agreed or strongly agreed that their children learned a lot. That this question would feature the largest divergence is not surprising, as learning is, to some extent, a function of all the items on this survey. Plausibly, success in one component of schooling is linked to success in another, just as failure in one is linked to failure in another. One could imagine, for example, that ambivalence toward responding to questions in a timely fashion tamped down on student enthusiasm for learning.

Subgroup Analysis

Researchers and policymakers worry that school closures could exacerbate long-standing racial and socioeconomic achievement gaps. I probe this concern by comparing assessments of brick and mortar online schooling performance from parents according to their racial self-identification, and whether they completed a survey for a child enrolled in a private school. Private school enrollment is a rudimentary proxy for wealth, as enrollment costs can be prohibitive for many families.

Overall, I observe mixed signals regarding equity concerns. Parents of African American and Hispanic students give appreciably higher marks for the performance of brick and mortar schools than do white or Asian parents. Indeed, African American parents give higher marks for communication, pedagogical efficacy, and classroom management. They also report more frequent active learning activities. Differences in construct scores by race regarding the performance of brick and mortar schools are statistically significant at the 99% confidence level. Most tellingly, while 21.6% of white or Asian parents at least somewhat agreed that their children learned a lot while their brick and mortar school operated online, 33.2% of parents of Hispanic children and 39% of parents of Black children at least somewhat agreed that their children learned a lot.

Table Five: Scores by Racial Group

		Black or Hispanic		**White or Asian**	
		K12 Inc	Brick and Mortar	K12 Inc	Brick and Mortar
Communication	Mean	6.33	4.38	6.23	4.06
	SD	0.79	1.61	0.90	1.51
Pedagogical Efficacy	Mean	6.31	3.92	6.23	3.41
	SD	0.79	1.69	0.87	1.56
Classroom Management	Mean	6.39	4.05	6.33	3.50
	SD	0.69	1.63	0.79	1.57

Differences in scores by school sector offer mixed evidence as to whether school closures will exacerbate achievement gaps. Among students in the sample who attended a brick and mortar school, 2,410 attended a traditional public school, 234 a private school, and 173 a charter school. Survey responses indicate that private school students received an appreciably better online education than did public school students,

whether traditional public or charter school. Because private schools are unaffordable to many families, their relatively superior performance during school closures elevates concerns about the exacerbation of achievement gaps. On the other hand, parents gave higher marks to charter schools than to traditional public schools. Charter schools serve a disproportionately high number of students of color and students who qualify for free or reduced-price lunch, so the superior performance of charter schools over traditional public schools arguably dampens concerns regarding a widened achievement gap (Rebarber & Zgainer, 2014).

All differences across sectors are statistically significant at the 99% confidence level except for communication between traditional public and charter school and classroom management between charter school and private school. Those differences are statistically significant at the 95% confidence level.

Table Six: Scores by School Sector

		Traditional Public School	Charter School	Private School
Communication	Mean	4.04	4.30	4.82
	SD	1.53	1.75	1.40
Pedagogical Efficacy	Mean	3.40	3.78	4.46
	SD	1.56	1.75	1.57
Classroom Management	Mean	3.47	4.17	4.50
	SD	1.57	1.50	1.50

Conclusion

Survey results indicate that students' experiences with virtual learning in Spring 2020 varied markedly according to whether they were enrolled in brick and mortar schools or virtual schools. That outcome does not qualify as a surprise: Virtual schools would be expected to outperform brick and mortar counterparts that were forced to adapt to virtual learning with limited warning. The magnitude of difference, however, is jarring: Respondents were almost 6.5 times more likely to report that their child "learned a lot" in the Spring if they were enrolled in a virtual school. Moreover, the advantage in the performance of virtual schools in delivering online education is not easily attributable to their performance in any one facet of schooling. Rather, survey results indicate that virtual schools dramatically outperformed brick and mortar schools when it comes to promoting active learning, communicating effectively, managing a classroom, and providing high-quality instruction. The magnitude of difference was less among students of color, whose parents reported a substantially better experience with online instruction in brick and mortar schools than did white or Asian parents. The magnitude of difference was also less among charter school students compared to traditional public school students, and private school students compared to all public school students.

Policy-relevant questions remain about these findings. For one, to what extent do parental assessments of learning predict achievement outcomes? As mentioned, questionnaires currently represent the best hope for gauging student learning during the pandemic, but it isn't clear to what extent such measures proxy for actual student learning. Looking ahead, it's also unclear to what extent the performance of brick and

mortar schools might improve in Fall 2020 with regard to virtual teaching. On one hand, that many and perhaps most districts did not announce their reopening plans until July or August capped the amount of time for which teachers and administrators could prepare for a virtual reopening. On the other hand, a few weeks of preparation for virtual learning is an improvement over the hasty closings that schools were forced to conduct in the Spring. Finally, it is unclear to what extent the experience of students enrolled in schools affiliated with K12 Inc. are representative of the virtual schooling sector.

Caveats notwithstanding, the radically divergent results revealed in this study suggest that, in prioritizing student learning, states would be imprudent to cap virtual school enrollment. On the contrary, in the interest of student learning, states should seek to expand access to established virtual schools through the course of pandemic-related school closures.

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