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Be prepared: online school experience and student achievement during the pandemic

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During the COVID-19 pandemic it was clear that not all schools were equally prepared to adapt to the challenges of online learning. While many traditional public schools struggled to transition to remote teaching, cyber charter schools–which already had experience with full-time online learning–appeared to demonstrate superior academic performance and less learning loss. This success may be due in part to the greater experience of these schools with online teaching, as well as that the type of student enrolling in cyber charters changed. Further research and external peer review is necessary to confirm the validity of these findings, but in the face of uncertainty and change, it is essential that we approach education with an open mind and a willingness to consider all perspectives in order to find solutions that truly benefit our students.

KEYWORDS

cyber school, virtual school, student achievement, learning loss, pandemic (COVID-19)

Introduction

The COVID-19 pandemic arrived in the United States during Spring 2020, surprising many in the education world and exposing gaps in the online teaching preparedness and experiences of traditional public school (TPS) teachers (Trust and Whalen, 2020). TPS teachers found themselves thrust into what has been termed "emergency remote teaching" (Hodges et al., 2020), which involved unfamiliar experiences of using synchronous and asynchronous online learning tools. These teachers also experienced the strain of managing student behavior in online classrooms, which further exacerbated their stress and difficulty (Hartshorne et al., 2020; Arnett, 2021b). To make matters worse, TPS schools often poorly implemented these changes, leading to even more problems (Veletsianos and Houlden, 2020).

However, not all schools in the United States were unfamiliar with online teaching when the COVID pandemic occurred. "Cyber charter schools" make up a significant portion of full time online schools and were named in early research by Clark (2001) which listed seven categories of online learning programs and has been used in the "Virtual Schools in the United States" reports regularly published by the National Educational Policy Center (NEPC; e.g., Molnar et al., 2019). Cyber school scholar Michael Barbour (2018) reported the history of cyber charter schools since 1994 with the inception of first fully online charter school (Darrow, 2010), to the beginnings of the two largest cyber charter school networks in 1999 (K-12 Inc.) and 2001 (Connections Academy). Barbour has also been a significant contributor to the NEPC reports on virtual schools mentioned above, and has noted that between 2017 and 19 alone, enrollments in cyber charter schools increased by nearly 30,000 students (Molnar et al., 2019). However, despite having nearly three decades in the field, enrollment increases experienced by cyber charters have occurred while they have consistently underperformed relative to charter and

traditional, in-person schools in regard to academic value added (for summaries see Finn et al., 2016; Saultz and Fusarelli, 2017).

Thus, the research question answered in this paper was: Did the increased experience with online teaching possessed by cyber charters translate to better student performance during the pandemic? In other words, did schools that had more online teaching experience prior to the pandemic perform better during the pandemic than those who did not have that experience? Some limited conclusions are also presented as to why their online experience did/did not correlate with their students' performance during the pandemic. In this paper, I answer these research questions through sharing reports provided by two, private corporations that are heavily involved in K-12 cyber schooling in the United States, along with my commentary on the relevance, implications, and limitations of the research.

K-12 online learning prior to and during the pandemic

To provide more detail on the scope of what was briefly stated above, cyber charter schools in the United States offer instruction at the primary and secondary levels to any student who chooses the school in their state, regardless of socio-economic status. Despite this, student ethnicity enrollment data from the National Center for Education Statistics (NCES) showed that cyber school enrollment demographics differ significantly from national averages, more than 15% more White-Non-Hispanic students, 13.3% less Black students, and 1.4% less Hispanic students compared to the national averages in those categories. It should be noted that Cyber schools in the United States do not assume that all students and families have access to high-speed internet and computers/personal devices. These schools provide free laptops and Internet Service Provider stipends to those who qualify as low socio-economic status of Free and Reduced Meals.

Unfortunately, cyber charter schools have consistently underperformed relative to charter and traditional, in-person schools in regard to academic value added (for summaries see Finn et al., 2016; Saultz and Fusarelli, 2017). The reports on cyber charter school performance provided by the NEPC (Molnar et al., 2019) have widely confirmed these poor performance results nationwide. It should be noted that cyber charters' poor academic performance has been carefully documented by the NEPC since 2013 (Miron et al., 2013; Rice et al., 2014; Huerta et al., 2015; Miron and Gulosino, 2016; Molnar et al., 2017, 2019). This research has been consistent with multiple state sponsored research reports from Michigan (Freidhoff, 2016, 2017, 2018), North Carolina (Department of Public Instruction, 2017), Tennessee (Potts and Donaldson, 2016), and Kansas (Legislative Division of Post Audit, 2015), other center and think tank based research from Ohio (Ahn, 2016; Ahn and McEachin, 2017; Center for Research on Education Outcomes, 2019), and Georgia (Public Impact and the National Association of Charter School Authorizers, 2015). Additionally, these results have been confirmed by the pro-school choice group, National Alliance for Public Charter Schools (2016) and another public think tank (Woodworth et al., 2015).

With that said, during the pandemic the academic achievement of cyber charter schools appeared to change. Recent research by two, large cyber charter school networks seemed to show improvement of student academic achievement. Both Pearson Online and Blended Learning and Stride researchers followed the Northwest Evaluation Association's (NWEA) methodology, which used a national sample of students concerning student achievement and learning loss experienced during the COVID pandemic (Kuhfeld et al., 2020). NWEA is the creator of the Measures of Academic Progress assessment (MAP) which is used widely in in-person and cyber schools in the United States.[1] Both corporations used the same methodology as NWEA did to analyze the data, which followed two processes to measure student growth. The first process was:

1. $MAPScore_{2020Diff} = MAP_{Winter2020} - MAP_{Fall2020}$
2. $MAPScore_{2019Diff} = MAP_{Winter2019} - MAP_{Fall2019}$
3. Compare $MAPScore_{2020Diff}$ and $MAPScore_{2019Diff}$ to understand students' growth.

The second process accounted for changes in normative student achievement by grouping student achievement into achievement levels and then tracked their performance between the categories of "before and during the COVID-19 pandemic." Students who increased from one level to the next were categorized as "Gainers," those who decreased levels as "Sliders," and those who maintained achievement level as "Maintainers." This analysis was performed using both the 2019 and 2020 longitudinal cohorts.

Research presented by Pearson Online and Blended Learning at the 2022 Digital Learning Annual Conference (Walters, 2022) showed that a national sample of 23,000 Connections Academy (CA) K-12 students ended the year ahead of their pre-pandemic performance as well as ahead of a national comparison sample from TPS (see Figure 1).

Similar research by Stride Inc (2021) compared results of students in their schools with research by the Northwest Evaluation Association (NWEA) which used a national sample of students concerning learning loss experienced during the COVID pandemic. Their research found that students enrolled in Stride schools outperformed the national sample in the NWEA study on their Measures of Academic Progress assessment (MAP) and also experienced less learning loss (See Table 1.).

Pearson Online and Blended Researchers also examined student achievement on the STAR test following the same methods used by Renaissance Learning, the author of the STAR Assessments (a series of short tests administered by Renaissance Learning to children in grades K-12 in the United States). In contrast to MAP tests, which measure progress, STAR tests measure mastery.

Thus, this is the methodology followed by Pearson Online and Blended (OBL) Researchers:

1. Create a performance estimate for each Pearson OBL student's performance at several different points during 2020–2021 school year on the assumption that the pandemic had not happened. All expectations of student achievement were based on pre COVID-19 STAR data and a prior STAR score for each student, and it was assumed that scores would generally be higher later in the school year compared to earlier.
2. Compared the expected performance for each Pearson OBL student's performance to their actual performance, and then group those results by subject, grade, and student subgroup.

1 https://www.nwea.org/

Results listed in Renaissance Learning's report, "How Kids are Performing: Tracking the School Year Impact of COVID-19 on Reading and Mathematics Achievement," showed that United States students in general, "On the Star Early Literacy and Star Reading scales, students ended the 2020–2021 school year, on average, 8 points behind expected pre-pandemic performance. On the Star Math scale, students ended the school year an average of 16 points behind expectations" (Renaissance Learning, 2021, p. 5, Spring). Compared to this national sample, a sample of 23,000 Pearson OBL outperformed pre-pandemic expectations and the national sample of United States students on STAR (See Figure 2).

In summary, cyber charter school students had less learning loss relative to charter, and TPS in-person schools. Learning loss has been defined as the amount students decreased in learning during a specific time period. A systematic review of learning loss during the COVID-19 pandemic showed that learning loss occurred across primary and secondary levels in schools, but more so in primary schools (Donnelly and Patrinos, 2021). This makes sense, as primary school students often have less self-regulation skills and thus require more help from parents or teachers (Tomasik et al., 2020). Connections Academy and Stride Inc. primary school students met or exceeded the United States based sample (Stride Inc, 2021; Walters, 2022). Interestingly, even those students hit the hardest by the pandemic in terms of learning loss did better at Connections Academic schools, with Black, Hispanic, and low SES status students having significantly less learning loss than their TPS counterparts (Walters, 2022), which matches nationwide and international trends among iReady Lexile scores (Maldonado and De Witte, 2020; Engzell et al., 2021; Gore et al., 2021).

Why did K-12 cyber charter academic performance during the pandemic exceed that of TPS and why was there less learning loss?

Thus, the answer to our research question was a clear positive: K-12 cyber charter school academic performance during the pandemic exceeded that of TPS and resulted in less learning loss. This leads us to an obvious conclusion: Two cyber charter school networks that have nearly three decades of experience with providing full time, online learning did a better job of providing online learning than traditional public schools that had little to no experience, resulting in less learning loss than TPS students from national samples. However, in light of the very clearly weaker pre-pandemic academic performance of cyber schools, this bears further scrutiny – why did cyber charter schools, who have nearly always underperformed compared to TPS, suddenly rise to the top?

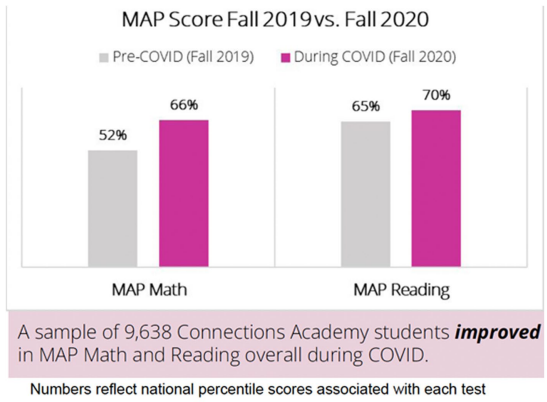

FIGURE 1
Pearson online and blended learning MAP score differences. Reprinted with permission of Pearson online and blended learning.

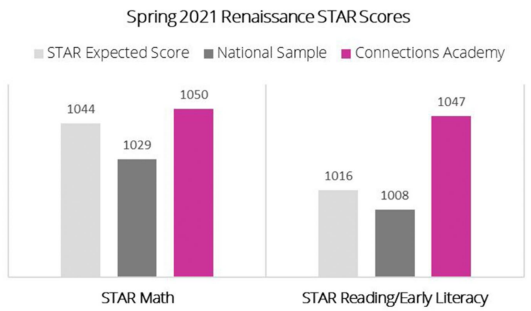

FIGURE 2
Spring 2021 renaissance learning STAR scores. Reprinted with permission of Pearson online and blended learning.

TABLE 1 Percentage point difference before and during COVID-19 pandemic.

Grade level in fall 2020	Students classified as "sliders" in reading			Students classified as "sliders" in math		
	National	Stride	Stride outperforms national group	National	Stride	Stride outperforms national group
4th	4.8	−6.4	✓	21.1	−6.6	✓
5th	5.0	−7.7	✓	18.5	−7.8	✓
6th	3.9	−4.7	✓	15.1	−10.8	✓
7th	2.6	−0.9	✓	10.6	−3.2	✓
8th	1.8	0.1	✓	8.5	0.7	✓

Positive numbers indicate an increase in the percentage of students classified as Sliders.
Negative numbers indicate a decrease in the percentage of students classified as Sliders.
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Potential reason #1: the number and type of student enrolling in cyber charter schools changed during the pandemic

The first potential reason that K-12 cyber charter academic performance during the pandemic exceeded that of TPS and that there was less learning loss is that the type of student enrolling in cyber charter schools changed during the pandemic. Despite the poor academic performance of these schools prior to the pandemic, during the COVID-19 pandemic enrollments in these schools rose rapidly, experiencing the largest rate of increase in half a decade (Veney and Jacobs, 2021). Cyber charter schools increased enrollment in nearly every state while district public school enrollments decreased. Two examples of this were in Texas, where 29,000 more students enrolled in cyber charters compared to the previous year, and in Oklahoma, where more than 35,000 students enrolled in cyber charters compared to the previous year (Veney and Jacobs, 2021). One possible reason for this huge increase may be that across the United States, parents were much more willing to permit their children to enroll in online courses–an increase of 17% compared to 2009 (Henderson et al., 2020). Another potential reason may be that when the pandemic's first impacts were being felt, some families fled to schools that were already established in the online sector (Kingsbury, 2021). Thus, the combination of a willingness to enroll their kids online and the pandemic's first impacts may have caused this large increase. But did the type of student enrolling in cyber charters also change during the pandemic?

Maranto et al. (2021) reported that the type of students enrolled by Connections Academy charter schools during the pandemic resembled prior groups demographically but reported greater success at their prior TPS schools and exhibited greater measured success in cyber schools. Kingsbury et al. (2022) also reported that the type of students enrolled by Stride Inc. cyber charter schools during the pandemic were similar demographically but that they were more likely to be higher achieving in Math and ELA compared to prior cyber charter enrollees. This tells us four things:

1. Traditional demographics stayed the same in the group, in other words, they had similar socioeconomic status, racial/ethnic composition, etc.
2. The COVID group succeeded academically at their TPS while the pre-pandemic enrollees generally were not.
3 Students enrolled previous to the start of the pandemic and those enrolled during the pandemic enrolled in the cyber charters because they were dissatisfied with their previous TPS.

However, the reasons that the pre-pandemic and during pandemic enrollees were dissatisfied with their previous TPS differed. During-pandemic enrollees to cyber charters overwhelmingly indicated that they enrolled because they were dissatisfied with the way their TPS was handling the pandemic. Pre-pandemic enrollees in cyber charters cited bullying and safety concerns, and student mental health concerns as driving their enrollment in cyber charters (Bradley-Dorsey et al., 2022). This is an important contrast to note because these factors are not usually included as part of student demographic data and were not considered by the achievement research comparing cyber charters with TPS cited above (e.g., National Alliance for Public Charter Schools, 2016; Molnar et al., 2019). So cyber school enrollments increased and the kind of student changed during the pandemic. But did these changes cause the increase in academic performance of cyber schools during the pandemic, or was it something different?

Potential reason #2: cyber charter schools' increased experience in online teaching relative to TPS

Schools across the United States were largely unprepared for the huge changes in instructional delivery methods and the accompanying management and behavioral problems that arose during the pandemic (Trust and Whalen, 2020; Arnett, 2021b). First, Hodges et al. (2020) makes a good distinction here that is helpful to our discussion–what TPS shifted to in March of 2020 wasn't online learning *per se*, but instead was "emergency remote teaching." Emergency remote teaching is when teachers are thrown into a completely unfamiliar situation with little to no preparation and asked to completely adapt their teaching and lesson plans for online delivery. Suddenly "online learning" was reduced to an abrupt change in delivery mode with little to no time to invest in the development of a high quality online learning experience. Seen in this manner, it's no wonder that TPS teachers were not ready for the shift (Arnett, 2021a) and cyber charter school students had less learning loss than TPS students, as they were taking courses that were developed by teachers and instructional designers over a period of years, rather than a few days, with instruction implemented by teachers with years of online teaching experience. Despite urgings by the United States Department of Education Office of Educational Technology (2016, 2017) and scholars (Archambault, 2011; Archambault et al., 2016) mentioned earlier, TPS were largely unprepared, and it showed. This lack of preparedness for the sudden shift to emergency remote teaching (Hodges et al., 2020) also points to a gap in teacher education for TPS (Trust and Whalen, 2020).

Now contrast the situation faced by TPS with that faced by cyber charter schools. Cyber charter schools had been doing full time online learning for more than 20 years. As such, it makes sense that they had developed a process for how to teach online as well as course development.

As stated in Hodges et al. (2020), effective online learning works because it involves the use of a model for design and development that follows a systematic process of instructional design (Branch and Dousay, 2015). It can often take 6 months to a year to design and develop a high quality online course. This development process considers such factors as how to apply specific learning theories in practice, fostering an online learning community, developing specific social supports, and the consideration of how specific curricular activities will help enhance the learning process. A study by the Christensen Institute lists potential benefits of such an approach to online learning at the K-12 level as flexibility in the time, pace, and path of learning for individual students, enabling mastery-based learning, and expanding teacher capacity, all of which support a constructivist approach to teaching and learning (Arnett, 2021a). Thus, cyber charter students' increased achievement during the pandemic (Walters, 2022) may simply indicate better preparation by their teachers for teaching online and an established online course development process compared to TPS teachers.

Moving forward from here: what can TPS and cyber charter schools learn from this?

The reality is that we do not know which of the factors above caused the increase in cyber charter school students' academic performance during the pandemic. However, it makes sense that it was a combination of the years of experience and established practice with online learning that cyber charters possessed as well as the difference in the kind of students enrolled.

during the pandemic. So how do we move forward from here? What can TPS and cyber charter schools learn from this?

A path for TPS

First, teacher preparation for TPS needs to include how to teach online. Scholars (Archambault, 2011; Archambault et al., 2016) as well as the United States Department of Education Office of Educational Technology (2016, 2017) have called for more preparation for teachers and administrators for years, with little change (LaFrance and Beck, 2014). Additionally, professional organizations have clearly articulated online teaching standards that have been adopted by many education institutions in both K-12 and higher education (iNACOL 2010; Quality Matters 2016), thus it is not a lack of clear standards that has led to this issue.

Schools of education and teacher preparation programs excel in preparing teachers with a solid foundation in pedagogical theory and methods for in person instruction. The traditional practice of these programs has been to assume that pre and inservice teachers knew how to teach online because of the generation in which they were raised, but this has been proven largely false. Teachers and preservice teachers need specific training in how to teach online effectively utilizing the pedagogy in which they are trained. It would make sense for schools of education and their certification programs to require at least one course in online teaching. This could help all schools, including existing cyber charter schools, which have difficulty identifying and training their teachers (Beck and Maranto, 2014). In addition, as Mehta and Teles (2014) argue, just as we now have programs and specialized certification routes to train, for example, secondary ELA teachers, it would make sense to have such institutional support for future online teachers. The Arkansas division of elementary and secondary education is among several other states that have implemented an online teacher licensure program (Division of Secondary and Elementary Education, 2022), However, most of these programs are only available at the graduate level and should become available in undergraduate teacher education programs as well as through alternative certification.

Despite clear standards and calls for change, many preservice teacher education programs take the approach that an online teaching course is not needed because it should be taught in "every course." The difficulty with this approach is that faculty who are not experts in online teaching or technology integration are asked to teach an unfamiliar subject. Unfortunately, what usually occurs is that very little of how to teach online is actually taught, and what is taught barely scratches the surface of what is needed. Additionally, there are still not nearly enough internship opportunities for preservice teachers who wish to gain experience in online teaching despite some pre pandemic progress (Archambault et al., 2016). Another contributing aspect to this is that there are very few undergraduate programs in educational technology and instructional design. Functionally, this means that preservice teachers do not get the opportunity to minor in a subject that would help them tremendously in how to teach online and design and develop online courses. It also means that most teachers have to wait until they taken graduate level classes to learn how to teach online.

What can be done to solve these problems? First, preservice teacher programs should consider partnering with online, district based programs as well as cyber charter schools to ensure adequate internship opportunities. Preservice teachers will be better prepared to teach online if they are provided with diverse opportunities to take part in a variety of online teaching experiences. Second, preservice teacher education programs need to ensure alignment of their curriculum with what is actually happening in online district based programs as well as cyber charter schools. Here are a few ideas on how this curriculum could be updated:

1. Create a focus on how to design, develop, and teach online courses and programs.
2. Address how to author a schoolwide Technology Strategic Plans for developing a flexible, adequate technological infrastructure.
3. Include how to use the actual Learning Management Systems (LMSs) and other online learning tools used in TPS classrooms.
4. Include cross training in how to use and troubleshoot the use of a variety of technologies for all teachers.

Although the above ideas would add value to teacher preparation programs, there is a tension between content and pedagogy in any teacher education program. Adding a course or even a module focusing on cyber teaching/learning is not as simple as a mere addition because teacher preparation programs can only be so expensive to aspiring teachers.

Implementation of these four priorities into preservice teacher and inservice teacher education would result in not only an increase familiarity of both teachers and students with the tools but would also allow for a seamless transition to full time online learning in the case of a future adverse event. It should also go without saying that preservice teacher education programs and TPS should consider asking cyber charter schools to partner in these endeavors.

A path for cyber charter schools

To be clear, nothing I have written in this paper should be taken as an excuse for the poor academic of cyber charter schools prior to the pandemic. It should also be clear that cyber charters should expect that the type of student they enroll will eventually shift back toward those enrolled pre pandemic. Partnering directly with teacher preparation programs may help cyber schools in developing a more solid pedagogy for online teaching and learning. Cyber charters need to deal with the problem of consistent, poor academic performance compared with TPS. The research presented in this manuscript indicate that some of this poor performance may be due to reasons for enrollment. Cyber charter schools need to focus on developing specific interventions based on the reason the student enrolled in the cyber charter. For example, an intervention for

bullied students might include mental health counseling; semi-structured opportunities to develop friendships with other students; extracurricular opportunities to become involved in peer groups and develop relationships; and more one on one time with teachers to develop mentoring relationships.

Another aspect that cyber charters need to address are the negative student achievement outcomes that are inherent to high student mobility. As already stated, there is a large amount of research on student mobility and its negative relationship with student achievement. Also, when a parent or student chooses to enroll in a different school, their student mobility is increased. Cyber charter schools' students' mobility:

1. Is much higher than TPS
2. Is often due to parents who chose cyber schools for their children out of dissatisfaction at their in-person schools

This points to a need to increase transparency of the overall transfer process of when and how a student moves from one school to another. Partnerships need to be developed with TPS to allow tracking of student data between institutions, which would permit the development of special protocols and processes for how to handle enrollments of highly mobile students. This may include the potential of an enhanced transfer process, as well as special supports for highly mobile students once they are enrolled. Such a partnership should also potentially provide reflexive training and mentoring opportunities in teaching and learning for both cyber charter and TPS teachers and students, to ensure that students are getting the best education, in whichever school.

Conclusion: a call for a unified approach

We need a unified approach to schooling that eschews partisan divisions between TPS and cyber charters. Although this hypothetically could be accomplished through policy work, it is more likely to begin through grassroots movements focused on partnerships between TPS and cyber charter schools to train TPS teachers. This might be a 'bridge too far' for some charter school advocates and opponents, but if cyber charters have weathered the learning loss from COVID better than TPS, then there just might be something to learn from them. TPS should seek out partnerships with cyber charters in their area and ask for cyber charter teachers to train their teachers in online teaching. If we care about what works best for children, we must be willing to take lessons wherever they exist. These partnerships should also be open to sharing TPS expertise with the cyber charter schools, as these cyber charters have much to learn in other areas of school life and administration. Unfortunately, the politicized nature of education in general and how that tends to force polarization on important issues will make these partnerships very difficult to achieve.

We also need to avoid unnecessary polarization between different modes of instruction, which can distract from broader system-level improvements. Too many stakeholders are preoccupied with blaming every educational ill on a specific mode of instruction (e.g., online learning). The reality is that online learning works well in specific situations with specific students. We thus need to shift research and practice toward finding out what works, with what groups of students, in which circumstances, and why (Kennedy and Ferdig, 2018). Unfortunately, technology based research and practice has a tendency to default to media comparison research rather than a more nuanced approach that yields results for specific groups of students in specific situations.

My purpose here was to explain how cyber schools performed compared to TPS during the pandemic and the lessons we can learn from it. Research showed that students enrolled in two, large cyber school networks outperformed national averages and experienced less learning loss compared to TPS students. In other words, organizations that had experience with full time online learning prior to the pandemic fared much better during the pandemic than those who did not have that experience. One limitation of this research is that it focused on cyber charter schools and did not consider whether a TPS already had a cyber school. Another limitation was that this study did not consider whether TPS administrators, teachers, students, and parents who were experienced in fulltime online learning, also had less learning loss. Future research should confirm whether these results are true for these other kinds of schools and cyber school experiences and explore how teacher education programs and inservice professional development can be used to improve teachers' online teaching skills and thus, better serve students.

It should be noted that the research studies cited above regarding learning loss and academic performance for cyber school students during the COVID pandemic was internal research published by each of the cyber school networks (Stride Inc, 2021; Walters, 2022). Although these networks assured me that their results were subjected to rigorous internal review, they should also be subjected to a meticulous external peer review process and replicated to ensure accuracy. Also, a limitations of this work include my lack of access to the raw data collected by Pearson OBL and Stride, Inc. As a result, I only had access to Table 1. Figures 1, 2, which were provided by the corporations. It should also be noted that the research cited on negative selection bias of students into cyber schools (Paul and Greene, 2022) was published and supported by the Educational Freedom Institute, a pro school choice organization in a midsized, southern state, and the NEPC reports on cyber charter school performance were published by a well-known, non-profit policy center that has consistently been critical of charter schools.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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