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Lessons Learned from Remote Instruction

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Introduction

The 2019-2020 and 2020-2021 academic years have been a period of unprecedented shock to our education system. Teachers who, in some cases, have taught in classrooms for decades were forced to adapt their tried and true methods to a new medium and move to virtual instruction overnight. In many cases, the challenges for students were even more extreme. Many students live in homes that, through no fault of their own, are inconducive to a learning environment. Even more difficult, many more students live in homes without stable internet or reliable computers. For the 2019-2020 academic year, of the more than 14,000 parents and guardians surveyed by the Philadelphia School District, 13% of them reported they did not have internet access at home.[1]

This type of all-in, emergency-style transition has strained our education system, educators, and students and their families to the extreme. Still, there are noted benefits to remote instruction and it may become a mainstay in the future of education. Indeed, with the progress in virtual connections and educational software and armed with a litany of research claiming students learn more[2] and that teachers generally grow to prefer it to traditional instructional styles,[3] "blended learning"[4] was an increasingly popular mode of instruction even before Covid-19.[5]

But although blended learning was becoming increasingly popular pre-Covid, the mass exodus to virtual learning in March of 2020 revealed serious shortcomings both in terms of network infrastructure and the tools provided to educators. As a result, it bears examination of the lessons learned, both to improve the quality of voluntary remote education post-Covid and to prepare in the event that mandatory remote education happens again.

This article will review lessons learned from shortcomings and successes both in voluntary blended learning scenarios and from the obligatory virtual learning caused by the pandemic.

Simplicity

An under-researched but perhaps unsurprisingly large correlative factor in how well students perform in online education settings is the simplicity of the program's user interface, including sign-in and integration with the computer system, and how instinctive the program is to navigate.

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[1] Stewart, et al., "Digital Learning During Summer 2020", 2020.)
[2] See, e.g., Means, et al., "Evaluation of Evidence-Based Practices in Online Learning" produced by the US Department of Education's Center for Technology in Learning, 2009.
[3] Moskal, Dzuiban, and Hartman, "Blended learning: A dangerous idea?" in *Internet and Higher Education* no. 18, 2013.
[4] Blended learning is a style of instruction which consisting of at least one distinct part of a curriculum which is taught online.
[5] See, e.g., the Philadelphia School District's prescient foray into blended learning in the summer of 2020 in Stewart, et al., "Digital Learning During Summer 2020", 2020.

If the program or programs used are not simple to understand and easily navigable, student attendance and consequently their academic performance will be negatively impacted. Although most studies measuring efficacy of online learning components do not focus on the simplicity of those components, we may take *a priori* the veracity in the principle of simplicity. The fewer barriers to learning the better. This is especially true where that learning does not have the benefit of the direct physical presence of an instructor and so requires outsized student and/or family responsibility.

Still, for an empirical examination of the concept of simplicity, we may again take the Philadelphia School District's 2020 summer program review. A rushed timeline for Philadelphia's Extended School Year (ESY) summer program meant that the different tools utilized were not incorporated into a single sign-on (SSO) system.[6] This mistiming contributed to delays as educators spent already-limited instructional time on allocating sign-in information to students and their families.[7] Zhang, et al.'s 2006 study on interactivity in online instruction also provides compelling evidence that intuitive and interactive online educational materials contribute to more effective learning compared to clumsily built or difficult-to-navigate interfaces.[8]

Organization & Support

The administrative and technical support students, their families, *and educators* receive as well as how efficiently the instructional design is organized both play critical roles in how well students form in that instructional program.

Particularly in situations without any in-person instruction time, the level of organization in the lesson plans have an outsized effect on student participation and comprehension. In scenarios where lesson plans and materials are not well organized, and particularly where students are young and heavy family involvement is required to facilitate online learning, researchers have observed large decreases in student participation. Frequently, this is because students and their families have difficulty in keeping track of a multiple classes and a cross-platform schedule, as the lines between home and school become blurred or completely disappear.

Another characteristic of successful online learning is the availability of constant support. Readily available and easily accessible IT support available during and after instruction times are critical to effective online learning. Unlike the relatively few problems that can crop up in a classroom setting that completely interrupt learning, these types of problems can be common in online learning when IT support is not available. In the Philadelphia School District's review of its 2020 blended learning summer programs, well over 50% of instructors reported that

[6] Ibid.
[7] Ibid.
[8] Zhang, et al., "Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness" in *Information & Management* no. 43, 2006 (see especially page 22).

technological problems posed a "moderate or serious" challenge to instruction.[9] Particularly in scenarios where the school district provides the hardware (laptops, webcams, etc.) and the lesson is being taught through a third-party vendor's software, the number of failure points for online instruction can be high. For successful deployments of online curricula, school IT administrators must be trained in any third-party software which utilized, and they must be available to support students and their families.

But while student IT support is critical, educators themselves must not be overlooked. Teachers, too, are subject to technological constraints, including unfamiliarity with vendor software, mechanical malfunctions, and internet network outages. In addition to technological assistance, another lesson learned from the Philadelphia School District's blended learning approach is that having another educator on standby (in this case an Assistant Principal) to supervise and fill in when a class's primary educator is unavailable (due to network outages or computer malfunctions) proves to be essential in maintain the continuity of classroom-wide lessons.[10]

In a similar vein, front-end professional development for these online resources must be provided to educators. Teachers must know enough about any software employed by their school district, and they must be provided this support with sufficient time in advance of beginning their instruction to subsequently design lesson plans around it. Moreover, because teachers frequently inadvertently act as frontline technical support for students in their classes, they have to be able to competently and quickly troubleshoot simple problems students may face to avoid derailing the instruction time or having a student drop from the lesson while they contact technical support.

Perhaps less intuitively than IT support, support in the context of online learning also entails extra academic support. Students in remote learning environments miss out on opportunities to ask questions in a live setting, stay after class, and compare notes with classmates in real time. This means that dedicated question time and, when the lesson permits, time wherein teachers interact one-on-one or in small groups with students are invaluable. In one blended learning program in the Philadelphia of summer 2020, the 1,397 participants logged 37,335 hours in *additional* support during the six weeks of the program's operations. That works out to an average of more than 26 hours per student![11] The prevailing consensus from the instructors surveyed is that the additional support helped make the program successful from the point of view of student performance.

Student Control

The benefits of an online component that supplements a traditional, in-person lesson are well recorded in a plethora of academic subjects and at all levels of education from elementary school

[9] Stewart, et al., "Digital Learning During Summer 2020", October 2020.
[10] Ibid.
[11] Ibid.

to graduate programs. But successful online lesson deployments, both in blended learning and in online-only instruction, generally report a thread of commonality in that they have a significant degree of student interactivity. For example, Cavus, et al. found that a highly interactive "advanced collaboration" produced a much higher mastery rate of the programming language Java than did a traditional learning group.[12] More compelling, the same study found that a regular online collaboration group (a second experimental group, as distinct from the advanced collaboration group) did about as well as the traditional group, such that the advanced collaboration group significantly outperformed both of them. Similarly, Gao and Lehman's 2003 study found that highly interactive groups outperformed control groups.[13]

Some studies have found mixed or insignificant impacts to learning when employing interactive tools. Frequently, these studies report strange results overall, suggesting that something is odd with the methodology of the study or with the instruction that one or both of the experimental and control groups receive during the course of treatment. For example, Cavanaugh, et al. conducted an experiment wherein the group which received the interactive material almost doubled the gain of the control group (a gain of 3.07 points in the mean of the experimental group versus a gain of 1.71 in the mean of the control group), but no statistically significant difference was observed due to the small sample sizes of the groups (14 in the control and 33 in the experimental group).[14]

I point this discrepancy in the study out not to impugn the credibility of the authors of that study. Indeed, quite the opposite. I applaud Cavanaugh, et al. for their work on this important subject. It is exceedingly difficult to conduct research in classroom settings for both design and ethical reasons. Moreover, the authors of that work admit to the very discrepancy I point out here. Instead, I make note of this oddity because although the balance of scholarly work concludes that interactivity is a positive factor, there is a considerable amount of work which does not (or cannot), and it is usually because something has gone awry in the study itself. Frequently this is through no fault of the investigators.

Attendance

A perennial problem in education is the rate of student attendance. This problem is compounded by the ease with which remote learning can be interrupted. Interruptions can happen either intentionally, in the case of skipping classes or not watching recordings, or unintentionally in the case of network outages or mechanical malfunctions.

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[12] Cavus, et al., "Assessing the success rate of students using a learning management system together with a collaborative tool in web-based teaching of programming languages" in *Journal of Educational Computing Research* no. 36, 2007.
[13] Gao and Lehman, "The Effects of Different Levels of Interaction on the Achievement and Motivational Perceptions of College Students in a Web-based Learning Environment" in *Journal of Interactive Learning Research,* no. 13, 2003.
[14] Cavanaugh, et al., "Effectiveness of interactive online algebra learning tools" in *Journal of Educational Computing Research* no. 38, 2008.

Under traditional, in-person education, students are often driven to school by car or bus. Even when students are old enough to drive themselves or close enough to the school building to walk to class and so could be truant with relative ease, their physical absence from a classroom is recorded as a matter of protocol and would be noticed almost immediately. In online learning, students usually connect from home and they may feign connectivity troubles, email misdeliveries, or other technical difficulties that usually cannot be independently verified by the instructor.

These issues are integral to a virtual environment. The very nature of distanced learning lends itself to these challenges, making them difficult to mitigate. Still, there are some critical steps instructors (and software designers) can take to keep attendance high.

First, the way in which educators communicate with families can directly impact the level of student attendance. Communications to students' homes should be clear and concise. It should bluntly state the importance of the lesson plans and how critical it is that students attend. Moreover, the Philadelphia School District's Office of Research and Evaluation (ORE) found that too many and too wordy emails are correlated with dips in student attendance, particularly in households where English is not the primary spoken language.[15] In almost all urban schools (and an increasingly large number of rural ones), households wherein English is not the primary spoken language is a significant proportion of the student bodies.

Second, of course the design, including the previously referenced criteria of student interactivity, simplicity, and organization, heavily influence the level of attendance. Pedro Gomis-Porqueras and José Rodrigues-Neto produced a fascinating mathematical modelling of student attendance as a function of the accessibility of online resources, the amount of material learned in class, and, significantly, the level of suitability of the online materials to constitute a lesson and/or their level of suitability to complement an in-person lesson.[16] Of course, the hypothetical modelling is not a one-to-one translation of reality in public education, as the model is based on undergraduate education (which is non-compulsory) as opposed to primary or secondary education. Nonetheless, the principle of the suitability of online lesson plans to adequately *replace or augment* (depending on whether the objective is blended learning or to be totally online) in-person instruction is certainly transferrable to primary and secondary education. Even the most studious pupil will give in to the temptation to skip an online class if the lesson is consistently lacking in content, boring, or exceptionally difficult to access.

Third, wherever possible, educators should be able to monitor student activity and performance. The performance component of monitoring is actually made simpler by virtual learning. Because all of the work is digital, trend analysis and even grading are made easier. Frequently third-party software platforms will actually integrate some method of analytics into their instructor version, allowing teachers to see which students are most and least receptive to each lesson, thereby allowing educators to target their extra support accordingly.

[15] Stewart, et al., "Digital Learning During Summer 2020", October 2020.
[16] Gomis-Porqueras and Rodrigues-Neto, "Teaching technologies, attendance, learning and the optimal level of access to online materials" in *Economic Modelling* no. 73, 2018.

The activity component, however, can be much more difficult to monitor outside of the classroom for an instructor who is not accustomed (or equipped) to teaching in an online setting. Still, great strides have been made in the field of online classroom management. Software like Imagine Learning makes it easy for teachers and administrators to examine log-in information (number of times a student logged in and for how long) both on an individual and aggregate basis. This variety of software can also mitigate student attempts at cheating because each problem set or essay question can be uniquely generated for each student. This unique problem approach in software allows students to collaborate in the process of solving problems, but not to share answers.

Conclusion

We know that elements of remote learning improve how much students learn. Blended learning is becoming increasingly popular at all levels of education due to the ever-increasing integration of technology with our lives. Moreover, as we have seen, instruction that takes place solely online can be involuntary as in the case of the Covid-19 pandemic. For either of these reasons, investment in online education materials is justified. We owe serious consideration to how we can best take advantage of an opportunity to improve education overall.

But this is not the whole story of online learning. As I hope I have shown here, it is vital that educators and students receive the support necessary to learning in a digital environment. Online learning represents a unique opportunity to reach more students and to make their learning more effective than traditional classroom settings. But as the Igbo of Nigeria teach us, “It takes a village to raise a child.” Without the appropriate planning, tools, funding, and administrative support, we are fighting an uphill battle as we transition to incorporating more elements of online learning (whether by choice or by circumstance) into curricula.

About the Author

Aiden serves as President and co-founder of the EAA. Both his mother and grandmother have been lifelong educators, instilling in him the value of education and the importance of instructional design. After graduating from the University of Pennsylvania, he started the Education Association of America to create the building blocks of a new educational design to give every student their best chance at success.

About the EAA

The EAA is a nonprofit corporation headquartered in Philadelphia, Pennsylvania. We make use of both programs and tools designed for educators as well as students to generate a holistic and comprehensive strategy to improve learning and set students on the path to success. **The EAA** leverages cutting edge cognitive science and empirical data to formulate our positions and develop resources for educators. Our platform is that American educators should always have access to the most up-to-date information on instructional design. Because our mission is to provide all educators with the right tools to do their jobs, all of our instructional plans are available free of charge. All of the data we use for our in-house reports will be easily accessible with perfectly transparent methodology, and all of our product endorsements will be based on empirical data provided upfront.

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