Learning at-Scale, Affordability, and Access in a Post-COVID19 World

Yakut Gazi[a], Nelson Baker[b] and Karen Sibley[c]

In his opening comments for this publication, Peter Stokes (2021) asks us:

- "[W]hat lessons will higher education draw from this experience and this history?
- How might the remarkably rapid adaptations in our approach to instruction, often achieved in a matter of days or weeks and under the threat of almost unprecedented public health, economic, and social crises, leave a lasting mark on the future of higher education?
- What, in other words, has COVID-19 taught us about higher education?
- And what will we do differently as a result?"

The essays in this volume and many other stories from the 2020 global pandemic illustrate the challenges of urgent horizontal scale in technology mediated instruction. Many say this experience will serve to accelerate instructional change long underway and perhaps to put the ultimate spotlight on issues of equity, access and cost. As they look toward the post-COVID future our authors coalesce around the compelling necessity to develop a stable and dependable ecosystem of learning technologies enabling the talent resources and expertise to guide and support faculty, create meaningful learner engagement, and pursue new opportunities for effective, accessible, affordable higher education.

Many organizations represented in this volume had either achieved or were well on their way to creating extremely affordable programs that are vertically at-scale, serving volumes of students unimaginable in a residential setting. Georgia Tech, for example, has been operating in the distance education realm since 1977, expanding its experience in the Massive Open Online Courses (MOOC) era circa 2012 and in 2014, launching the world's first online computer science degree at scale, at a tuition price point less than $7K (Georgia Tech News Center, 2014). This program grew from 1,255 students in its inaugural fall to 10,559 in fall 2020. This

[a] Georgia Institute of Technology, yakut@aggienetwork.com, ORCID: 0000-0001-6988-1887

[b] Georgia Institute of Technology, nelson.baker@pe.gatech.edu, ORCID: 0000-0001-9913-3230

[c] Brown University, retiree, Karen.H.Sibley@gmail.com, ORCID: 0000-0001-5287-7945

program enrolls seven percent of all of the master's degrees awarded in this field in the US (Goodman, Melkers, & Pallais, 2017), creating significant access for individuals largely unable to access and/or afford such education before. Our work in this area has expanded and today, seventy percent of Georgia Tech's graduate students are online (16,247 out of 23,210) with the majority being part-time students who are working adults and online enrollment represents 40.8% of the overall enrollment of 39,774 in Fall 2020 semester. Experimentation and development for the capacity to produce excellence in online education was already happening at Georga Tech pre-COVID. The pandemic pushed us into overdrive.

Does recent experience provide the impetus to explore and expand the impact of the methods employed by these programs in application to the horizontal scaling of learning, provoked by the urgency of the pandemic, that can also help to achieve affordability and accessibility goals? Is it possible to develop the technology and talent services to achieve both horizontal and vertical scale without a concomitant linear increase in cost as student numbers increase? Can a more diverse learner population (including geographic, ethnic and age/career stage) be better served if both horizontal and vertical scale exists? These questions and more will drive conversations, strategy, experimentation and change for many years to come.

We hope this book, written during the year of the COVID-19 pandemic in 2020, will provide a historical account that will contribute to informed and rapid change expected across the education landscape. The work of innovation in higher education and embracing learner-centric cultural and operational tactics and enabling our students to benefit from accessible, quality learning experiences in a radically affordable manner, is just beginning.

The pandemic quickly plunged both faculty and students into the unknown. Access to physical campuses and classrooms was eliminated in the middle of the 2020 spring semester, with only limited access eventually resumed after months of detailed planning for social distancing and lower density instructional spaces. Often even when some students returned to residential instruction, faculty were also teaching many others continuing to study online. According to the Quality Matters CHLOE survey, when COVID-19 hit 50% of faculty, 51% of undergraduate students, and 27% of graduate students in U.S. institutions had never taught or learned online (Garrett & Legon, 2020). In addition, as Branon from the University of Washington shares (2021, in this volume), across the US there were estimated to be fewer than three instructional designers per institution leaving faculty at almost all institutions to struggle on their own with unfamiliar technology and urgent demands under emergency circumstances. While disconcerting to say the least, the urgent and broadly shared crisis created an environment ripe for innovation. Education has been irreversibly changed.

Stakeholders around the globe and across all levels of education experienced significant discoveries as a result of the very difficult emergency response dedicated to maintaining instruction in 2020. Many who had not previously been involved in the use of technology in teaching and learning developed new recognition of the enabling effect of pre-COVID readiness, the importance of ease and single point of entry for faculty and student support, the value of cross-unit alliances to support the instructional endeavor, the realization that not everything scales (horizontally or vertically), and the need for alignment between policy and technological advances. We, and others, also benefited greatly from knowledge sharing between other higher education institutions through the network established by our Georgia Tech's annual "Affordable Degrees at Scale" symposium (see Affordable Degrees at Scale Symposium, 2020).

From institutions like the University of California Davis, Louisiana Tech and Georgetown University (Schwedler; Johnson and Hoover; Otter and Ray, in this volume) we benefit from accounts of essential strategic approaches to building and sustaining a structure to support vertical and horizontal scaling of instruction and learning during and after COVID. They emphasize the criticality of embracing institutional values in determining strategy. In Maryland, Bishop et al (2021, in this volume) further expand on a strategic approach at the university system level, where multiple institutions and their values and priorities need to be considered in order to inspire cultural transformation and enable innovation. For innovation to "stick", the long established and comfortably familiar model of instruction will need to flex, embracing new understanding and possibility illuminated by the crisis.

As faculty across the country continuously improve their online teaching capacity and comfort, we expect they will discover many superior aspects of hybrid approaches as opposed to the simple choice between exclusively online or residential instruction. Anecdotally, many faculty are already expressing a desire to continue to be able to teach online/hybrid post-COVID. Even when pandemic risks recede, the convenience offered by technology will be hard to give up. There are institutional, state, regional, and federal policies and guidelines that will need to be considered, rethought, or challenged to enable faculty along this innovative path. We hope to also see efforts at graduate schools to provide learning sciences, online pedagogy and technology skills for future faculty.

At Georgia Tech a key achievement in producing vertical scaling of learning is the unique structural and business model that focuses on economies of scale. These programs attract a large number of students, generating larger than usual revenue, while keeping many costs, including those for faculty, fixed or not increasing linearly. This is done by increasing the faculty-student ratio while utilizing additional instructional personnel (teaching assistants,

graders, instructional designers and technologies) to maintain delivery quality and the quality of the student experience. "At scale" courses and programs are designed and built to effectively address a "many learners" model.

In contrast, standard practices in residential instruction are structured so that more students require more courses, more faculty and more classrooms in addition to the myriad other services a residential campus must provide, hence always more cost that can imbalance the business model. The 2020 pandemic experience of horizontal scaling of technology-based instruction reproduced the traditional business model of typically small numbers of students across many courses with parallel increases in cost of operation. Surendran and Vinod; Lee et al; Joyner; Scagnoli and Maurer (2021, in this volume) describe how critically important the pre-COVID vertical at-scale innovations were to their institutions' abilities to respond to the pandemic. Now we should explore other factors in sustained improvement post-emergency.

The horizontal scaling of learning using digital technologies has not been a widespread phenomenon pre-COVID. This type of scaling feels out of place against the backdrop of our traditional college experience, so it faces cultural pushback. If horizontal scaling of online learning continues to engage the "many instructors" model, effective teaching preparation and support of these faculty becomes essential and should benefit from lessons learned from the vertical at-scale approach. For example, in vertical at-scale learning the courses are typically designed by a team of specialists and courses, or elements of them, are reused for a number of semesters. To reduce cost and improve quality in horizontal scaling, faculty will ultimately need to embrace the role of the course designer and creator since insufficient specialist capacity exists and increasing these resources will increase costs. Georgia Tech had a large group of faculty teaching in our online courses pre-COVID and some of these individuals were able to advise, guide, and act as resource partners for their less experienced peers. During the pandemic many institutions began to deploy a train-the-trainer model to improve faculty capacity with the pedagogy and tools essential for quality online instruction. Can a next step include the reuse of courses or components of courses developed during the COVID-19 period to create cost efficiencies?

Though we had a stable technology ecosystem in place to support online instruction, the pandemic quickly identified challenges. For example, some services were only provisioned and licensed for specific online programs, such as proctoring solutions or robust enterprise video recording and editing solutions. Adding to the initial issues of gaps in enterprise technology infrastructure, as in many other large institutions, the human capital supporting faculty teaching is distributed in multiple units at Georgia Tech. Under the leadership of Georgia Tech

Professional Education (GTPE) an alliance was quickly formed with key units to create a single point of entry for support requests, and what later proved to be more important, a nexus of expertise that will provide faculty development programs and offer guidance. The Office of Information Technology, the Center for 21st Century Universities, the Center for Teaching and Learning, and the Libraries are the key partners of this alliance. Asynchronous and synchronous programs and resources developed through this partnership marked the key contribution to Georgia Tech's effectiveness in remote/online and hybrid learning in 2020. This alliance, dubbed the Georgia Tech Remote and Hybrid Teaching Academy, released many of these resources to the public under the Creative Commons license (Georgia Tech Remote and Hybrid Teaching Academy Open Access, 2020).

Across the nation, early data in spring 2020 did not instill confidence in remote learning. In one study of 1000 students, 75% of students said that their e-learning experience was not of quality (OneClass Blog, 2020). In another national study of 14,000 students only 15% thought their online classes were as effective as in-person classes (Patch, 2020). As we moved towards the fall 2020 semester, many Georgia Tech students – and parents – demanded that we offer engagement opportunities for students, preferably through safe in-person gatherings, as opposed to just asynchronously or synchronously delivered lectures. However, as many of us saw in the fall semester, students wanted to come back to campus, but did not necessarily flock to the classrooms even when their classes had the option of in person attendance. They complained about isolation because even when they attended classes in person, often they lacked the opportunities for meaningful interaction with the breadth of students at the same time, in the same place, as they once had done. The American college experience is largely defined by the in-person immersion in the study halls, workouts at the gym, hanging out at the fraternity/sorority establishments, and participation in the campus community at large. When campuses shut down and attempted to offer online instruction to replace campus life, many institutions faced class-action lawsuits, demanding pro-rated tuition or full reimbursement (Binkley, 2020; Cappelino, 2020). Many colleges found themselves in the deepest financial trouble of their existence due to declining enrollments and reimbursements issued for no-longer-offered campus services (Binkley and Amy, 2020).

We argue that the "wicked problem" which COVID-19 presented to us in higher education is the rethinking of the student experience. Branon (2021, in this volume) discusses the importance of scaling up university services, emphasizing *student* services. While demand for meaningful in-person experience continues, we do not think that the prevalence of on-campus lecture pedagogy will spring back to its pre-COVID status, nor do we think it should.

Better quality online instruction and increased acceptance of this mode of instruction is likely to encourage students to reject the traditional in-classroom lecture which can easily and more comfortably be consumed online. Our campuses will need to be designed for full and meaningful engagement that requires physical presence and optimizes both student learning and quality use of their time. Agarwal (2021, in this volume) argues that the future of learning is blended. For many years instructional designers and learning scientists have advocated flipped and inverted learning, where content delivery and lower-level cognitive learning is pushed online while the classroom is used to engage in discussion and analysis. While this is not a novel concept, COVID-19 is likely to be the precipitating event to bring inverted learning to centerstage. In a similar fashion to the way "MOOC mania" circa 2012 invigorated and propelled the field of online learning that had been in existence for a good 20 years, perhaps the 2020 pandemic will precipitate long-recommended changes in instructional design and learning on campus.

Another significant question is that of who is left behind when the classic "American college experience" is unattainable for many. COVID-19 exacerbated the differential effects of income, race, gender, and socioeconomic background on student success (Anderson, 2020). Inequitable differences in access to stable and high-quality internet, also hit the spotlight. While basic services like electricity, transportation and television are assumed, perhaps the time to assume the need for internet access has now arrived. The public and policy makers should demand more on both the infrastructure and access fronts. Education policies and practices have fallen behind the rapid changes in technology and its potential. We need to pay close attention to the chasm that virtual education has created, or perhaps simply illustrated and worsened. As we look at 2021 and beyond, we need to be thinking about broad and equitable access to education for students of all ages to enable social achievement, job readiness and quality life experience.

This volume and its many contributors illustrate often heroic response to a crisis of urgency while they also represent the many across higher education who stand ready to participate in, lead and effect the coming changes in higher education and the way in which it serves society.

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