**The Digital Chasm for Disadvantaged Students in Postsecondary Education—Bandwidth Is Only Part of the Problem**

S.Ruth1, T.Sosorburam1

1George Mason University (United States)

**Abstract**

The digital divide is a familiar term often employed to describe accessibility differences in broadband Internet deployment. While Internet access for postsecondary education students continues to improve, there is a significant new challenge due to the abrupt and unexpected requirement in March of 2020 that most college courses be taught almost entirely online. The resulting situation for some already disadvantaged students is far more challenging than simply a digital divide – it is a digital chasm.

The digital chasm is not about simply sporadic "Wi-Fi deserts" where some college students are occasionally unable to connect from home– these are relatively rare. The serious problem we discuss here has to do with the disparity of resources to help students who are disadvantaged in any way – financially, intellectually, physically, technically, socially, or spatially – to leverage the full advantages of online learning. These students begin every learning experience behind their more electronically sophisticated, Internet-savvy peers with a built-in disadvantage, a challenge that grows over time as the better-prepared students widen the gap.

In this paper, we will examine some of the manifestations of these disadvantages with several specific examples of real-world experiences. For example, students with low Social Economic Status (SES) are vulnerable because they sometimes lack the funds to buy an appropriate laptop or subscribe to a dependable online service provider. They are also less likely to have access to university technicians, librarians, and other online assistance. In community colleges where the average student is 28 years of age, there are higher technical illiteracy and technical resistance levels than for younger peers. Late-adult learners may be more confused and intimidated by technical complexity. Also, many online college classes do not have special facilities or accommodations for students with disabilities, like blindness or deafness, among others.

Online learning not only requires technical skills, but also active engagement with the course content, the faculty, and fellow students. Less experienced new students also face challenges of self-motivation and self-regulation. Students from lower SES groups often live in crowded family situations where they lack an appropriate place to study. Because of hard-to-convert classes, as in nursing and technical courses, students’ skills practice is challenging, even for the well-equipped matriculants.

There is another issue that contributes significantly to the digital chasm: the lack of preparedness of many instructors to move to digital modes of teaching. Prior to the abrupt switchover in March 2020, about one college student in three was taking at least one course online. Faculty attitudes about online learning at that time were generally not positive. For the past two decades, only about 35 percent of permanent college faculty approved of distance learning, and this number is even lower for senior, tenured faculty. So disadvantaged students may face not only a digital chasm in fully leveraging online courses but also a potentially increased risk due to uncertain attitudes and skills of the faculty.

The problem of the digital chasm for disadvantaged students does not have one easy solution. Additional funding for equipment or better bandwidth may help. An increase in tutorial staff or more careful tailoring of online software to the needs of the disadvantaged could be useful too. But the hundreds of books and articles over recent decades about various remediations in college education aimed at improved graduation rates are do not point to a clear solution.

*Keywords*: digital divide, COVID-19, SES, disadvantaged students, postsecondary education, online learning, remediation in postsecondary education

1. **Introduction –importance of delineating the uneven playing field for some increasingly disadvantaged college students**

Despite the fact that all American colleges have adequate Internet access, significant, lingering disparities exist with respect to disadvantaged students. These disadvantages take many forms: lower socioeconomic status (SES); lower levels of connectivity and maintenance; lack of proper equipment and e-readiness; technical illiteracy; lack of self-regulation/low persistence and health disabilities. Each disadvantage contributes to the overall separation between digital haves and have-nots in postsecondary education and each will be discussed individually. While this situation existed before the COVID-19 epidemic of 2020, the learning process has become even more uneven for disadvantaged students since then.

By examining these disadvantages one-by-one it may be possible to suggest of remediation measures that deal constructively with the broad array of challenges. The bulk of our analysis in this paper will consist of defining the characteristics that render it difficult for disadvantaged students to have a level playing field with respect to leveraging the opportunity that a college experience provides. We will then point to possible remediation measures that could gradually lead to an evening and balancing of the success potential for all students, advantaged and disadvantaged.

1. **Describing the varieties of inherent disadvantages**

**2.1) Disadvantage: Lower Socioeconomic Status (SES)**

Socioeconomic status is a well-known predictor associated with progress in business, education, general skills acquisition, and many other activities. It is also a factor in achieving successful outcomes in e-learning. A survey from ten community colleges across the U.S. revealed that 34 percent of respondents named paying expenses as the top challenge to success. [1] As would be expected, the effect is uneven across different income levels. A study by Gonzales et al. found that students from lower SES have to rely on unstable devices and connections, which adversely affects their grades and graduation rates. [2]

The COVID-19 pandemic required the education system to implement various distance learning tools and forced students to adapt and adjust to online learning. The pandemic's total disruptive impact on students is still not clear, yet one recent analysis of public universities in the U.S. found that 13 percent of students have already delayed graduation,40 percent lost an internship or other job offer, and 29 percent now expect to earn less at age 35. These effects have been highly heterogeneous. One-quarter of students increased their study time by more than 4 hours per week due to COVID-19, while another quarter decreased their study time by more than 5 hours per week [3]. This heterogeneity often followed existing socioeconomic divides; lower-income students are 55 percent more likely to have delayed graduation due to COVID-19 than their higher-income peers. [3]

Furthermore, the public health emergency increased school withdrawals, decisions to take a gap year, and not enrolling at the college at all. [4] In 2020 about 100,000 fewer high school seniors completed financial aid applications to enroll in college. [5] This disproportionally affects students in certain racial and ethnic groups. NSC Research Center found that first-year student enrollment declined 18.9 percent in community colleges; the sharpest declines were among males of Native American, Black, and Hispanic 20.1 percent, 19.2 percent, and 16.6 percent, respectively. [6]

**2.2) Disadvantage: Uneven and often unstable connectivity and maintenance—"Wi-Fi deserts”**

Responding abruptly to the COVID-19 pandemic, most colleges shifted to almost fully online teaching so quickly that the inherent divide which already existed between levels of Internet sophistication became more apparent. Connection to the Internet has often been challenging in rural areas. One cause of this is limited-service providers, which force consumers to use insufficient connections. [7] But not having a connection is not the only cause; there are also difficulties with maintenance and malfunctioning. A survey of 748 college students revealed that almost 20 percent had challenges maintaining their connection, for reasons including data limits, shared access, connectivity problems, and hardware issues. [2]

The term "Wi-Fi deserts" has been used to characterize locales where convenient connections to Wi-Fi networks are scarce, It also is apt in the context of students who are driven from campus by Covid-19-induced lockdowns. Most institutions have powerful Wi-Fi available throughout the campus, and when students no longer have this resource available, many have to adopt coping mechanisms that result in lower service levels and productivity. In some cases students have to access the Internet through fast food outlets like McDonald's and Starbucks – not an ideal, stable platform for learning. [8]

Although connectivity is increasing, low-income and rural households are still disadvantaged in online learning platforms. A recent survey by New America Higher Ed revealed that 57 percent of college students encounter challenges accessing a stable, high-speed Internet connection, and 17 percent of them had to purchase a new Internet connection. [9] Another Higher Learning Advocate survey showed that 20.4 percent of students have trouble connecting to live video lectures, 12.2 percent experience difficulty accessing recorded video lectures, and 14.8 percent cannot browse school webpage contents. [10]

**2.3) Disadvantage: Lack of proper equipment-- the “homework gap”**

Equipment, bandwidth, and SES are closely interlinked. Students now need to possess their own laptop, microphone, and personal communication technologies to access virtual classes. The New America Higher Ed survey (2020), mentioned above, also revealed that 50 percent of college students have challenges with specialized equipment such as a high-quality camera or microphone to access online education. The same survey also reported that 44 percent of students needed new laptops, 21 percent additional computer software, and 14 percent a new video camera to keep up with the educational transition. Furthermore, ,on average 66 percent responded that high device costs were a problem but for Black and Latinx students the numbers were 78 and 80 percent respectively. [9] Students with technical difficulties experience frustration due to pressure to turn in homework, download files, submit assessments, or take exams, resulting in lower student satisfaction with online learning. The result is a “homework gap”, which was worsened by the COVID-19 pandemic. [8]

An Institute of Higher Learning Advocates survey also showed that 37.6 percent of students predominantly use smartphones, and 15.4 percent utilize tablets to complete coursework. [10] Relying on mobile data to complete coursework from a phone is another big disadvantage. Mobile data plans are not compatible with completing an online course, which means that students are more likely to miss the deadline and fall behind. Hampton et al. reported that students' lack of laptops and forced access to the Internet using a mobile phone negatively correlated with academic performance compared to those with fixed connections with laptops. [11]

**2.4) Disadvantage: Technical illiteracy and e-readiness—“cans” and “cannots”**

The digital divide is traditionally considered to refer to individuals’ access to technology and information. But technical skill differences go deeper. Improving a user’s technology sophistication is obtained through a stepwise process from successively lower to higher levels of comfort; that is, “have nots” and “cannots” to “haves” and “cans”. [12] The “cans” are tech-savvy students who leverage technology in multiple ways and accumulate digital skills comprehensively. In contrast, “cannots” are frequently non-traditional students, often defined as over 25 years old and first-generation college enrollees with limited technical skills. [12]

Age is negatively correlated with computer skills acquisition. A 2016 National Postsecondary Student Aid Study revealed that in two-year public community colleges, 43 percent of students are between 25-59 years old. [13] Along with the digital skills gap, higher resistance to technology has also been found to be associated with older learners. [14] As mentioned in the Barney et al. article, older learners have less opportunity to gain the skills needed to advance than digital natives. [15] Moreover, confidence in learning technology is another determining factor, as demonstrated in a UK study of a “mature” classroom where older students performed worse than their younger peers. [16]

**2.5) Disadvantage: Lack of self-regulation and low persistence—increases in anxiety levels**

Another challenge of on-line learning is the ability of the learner to acquire the discipline, self-regulation and mental preparedness needed to succeed. Self-regulated learning requires students to set goals, and monitor and regulate their behavior. These skills are an important component of online learning success and are often correlated with academic performance [17] and drop-out rates. [18]

A 2020 Barnes & Noble college student survey revealed that a sudden switch to online learning required significant adjustment time. A person who has previous online learning experience adapts more quickly than someone with no prior experience. [19] Also, a systematic review by Rasheed et al. reported that when shifting to full online mode, students' self-regulation and self-motivation capacities are critical. [20] A study by Broadbent et al. revealed that time management and effort regulation strategies, are correlating factors of academic performance. [21] Clearly, learners lacking these skills are likely to be disadvantaged because the full autonomy and freedom offered in virtual courses may result in substandard self-regulation, poor time management, procrastination, and underperformance.

Anxiety levels are also increased by lower levels of self-regulation. In a recent survey, most college students responded that they are anxious about full online learning, 55 percent were concerned about the lack of social interactions, and 45 percent thought that they will not perform well academically. The same survey also found that 60 percent of students were “somewhat ready” to switch to fully online learning. However, over 64 percent still worried about their motivation to work remotely for the long-term. [19]

**2.6) Disadvantage: Students with health disabilities**

The pivot to online learning has brought significant social and economic impacts for vulnerable groups. Students with health-related disabilities now face more fear of infection, financial instability, and school accessibility than their healthy peers, in addition to their pre-existing conditions. Zhang et al.'s comparative study of students with and without disabilities revealed that students with health issues have more mental challenges, including stress and distress, in the pandemic era than during more normal times. [22]

Yet there are advantages. As described by Hanjarwati et al. some students with disabilities are positive about online learning because of accessibility, flexibility, and ability to control the learning process. [23] Indeed, virtual campuses allow a certain degree of accessibility and convenience to students with disabilities, including learning from home and requiring no transportation to enroll in classes or utilizing other online services like campus visits, meeting with advisors, etc. [24]

Most online postsecondary education courses were not designed considering the accessibility and usability aspects for students with disabilities. During the rapid changes that were made in the pivot to on line mode, disabled students’ needs were not a primary concern. Students with visual and hearing impairments are significantly affected. Examples are the availability of subtitles for video classes for deaf students, a sign language interpreter, or accommodation for colorblind students to differentiate computer screen backgrounds. [25]

1. **The Effect of Covid-19 on faculty and their perceptions of the efficacy of online learning**

When the pandemic hit postsecondary education it suddenly became necessary for most college courses to be taught online. To describe this situation as abrupt would be an understatement, especially since over the past two decades, full-time faculty aggregate perceptions of online learning have not been very positive. Ruth and Lin traced the Babson College (2002-2016) Inside Higher Education/Gallup (2012-2019) annual reports with respect to perceptions of favorability toward online learning from administrators and faculty. For administrators, the approval rate has been steadily around 70 percent or more, and for faculty considerably lower, in the mid-30 percent range. [26] The Inside Higher Education Gallup report (2019) indicated that faculty favorability was increasing in aggregate, but with the lowest favorability ratings still among senior, tenured professors. [27] In some ways, this long-delayed improvement in faculty favorability concerning online learning came at a propitious time. More than one in three of the 20 million American college students was already taking at least one of their courses online, and one in six were taking all of their courses online. If barely one in three faculty members approved of online education and already one in three students are experiencing it, it would appear that some sort of clash would be inevitable. [28]

There is already evidence that this perfect storm between less than enthusiastic faculty and apprehensive students would have consequences. In interviews with over 3000 students in April and October 2020, Kevin Kelly and the Top Hat group found that while students generally approved of the steps taken by faculty and the institution to try to make the transition from face-to-face to online, the overall findings showed significant disapproval of online learning, as compared with face-to-face instruction. [29] To quote the report

“Students experienced the same levels of difficulty adjusting to online learning from spring to fall with a few exceptions. …It’s notable that in both surveys a) over three-quarters of all students felt that they lacked an engaging in-class experience while online and b) fewer than 10 percent of all students reported having no difficulties adjusting to online learning.” [30]

Since tenure-track faculty did not enter into their spring and fall 2020 teaching duties with very high opinions about e-learning it was almost certain that their performance in online courses would not be optimal. Could a decades-old sentiment about online teaching being somewhat inferior to face-to-face be changed drastically in a short time? Since the number of students taking online college courses rose from 35 percent to in the range of 90 percent literally overnight, and faculty were forced to experience an unwanted teaching medium, it is not surprising that favorability ratings would suffer.

1. **COVID-19 has exacerbated existing negative trends for potentially at-risk students –effects on upward mobility**

Another major issue associated with COVID-19 and e-learning is much broader and significant – the potentially debilitating systemic changes that affect disadvantaged students more seriously than others. In a recent podcast presented by Prof. Brian Alexander at Georgetown University, this point was discussed in considerable detail. [31] The abrupt shift to hybrid and online modalities has a much greater effect on students who are poor, less sophisticated with technology, and marginally ready for college. Particularly if one views the purpose of post-secondary education as reducing inequality and increasing upward mobility, the change can be seriously harmful to disadvantaged college students. The abrupt shift to online learning also highlights systemic problems associated with disadvantaged students based on K-12 preparation. If the arriving student is, for example, a first-generation college candidate, or a graduate of a K-12 system that is below average, a deterioration in the college experience can be a severe differentiator – making a difficult task almost herculean. [32]

A graphic (chart 1), recent description of these systemic problems with faculty and students caused by the pandemic can be seen in the chart below, which was included in the study just described. [30] Most of the comments have to do with the typical characteristics of a disadvantaged student – difficulty in accessing the Internet, computer access, etc. The differential effect of each of these challenges is clearly greater on the student who enters the college learning process lacking some of the facilitating essentials.

*Chart 1: Comparison of students’ difficulties adjusting online learning based on the Oct 2020 Top Hat report*

1. **Conclusion—Can Remediation Help?**

Online learning offers flexibility, but disadvantaged students face numerous challenges on the virtual campus. Educational and digital gaps are wider than ever before. The deficiencies in technological access are closely interlinked with income and SES, so initiatives to support students by providing subsidies or loans to buy computers, laptops, and software are a crucial part of any solution for academic success. The need for technical support is not only for the student's side; assistance for improvement for technical competency among the professorial community is also clearly evident.

In some cases, disadvantaged students who have access to technology and devices still lack the skills to utilize them properly. Academic advising, like virtual class guidance, effective time management consultation, and study plan advising, would help reduce disparities. This could also decrease withdrawal rates and increase course success in both online and in-person classes. Furthermore, dedicated support is essential to mitigate digital skills differences, especially for non-traditional students. Not every student is comfortable with virtual learning; there are high levels of anxiety and stress associated with this sudden shift to online. Teaching strategies could be modified to improve students' engagement, motivate them, and make classes more interesting and interactive. Some colleges offer counselors or e-learning advisors to help students deal with personal and mental health issues and combat students' isolation and disengagement. Research supported by the Urban Institute (2020) suggests that to improve adaptive learning technology, practicing more repetitive activities that students struggle with is critical, and institutions can increase their interactions with students by engaging in social media communication such as chatting, blogging, and peer mentoring. [33]

All of these solutions seem to be reasonable – additional funding aimed at improving the quality and quantity of equipment in connection, plus assisting individual students with more individualized help in both technical as well as course related issues. But the most obvious potential solution would seem to be taking steps ahead of time to be sure the student has the proper confidence and competence, along with the proper suite of technological tools. This pre-course coaching is often referred to as remediation and has been researched extensively for a century or more, particularly in the last several decades. The idea is a simple one. Whatever gaps the student may have before any learning experience, whether in technology or subject matter, can be filled in through the use of skilled coaching. Lately this coaching is often accomplished through noncredit courses, many of them administered online. The theory is that once a person gets used to the milieu of the topic and practices various skills before the course begins, the learning experience is enhanced and the outcomes more successful.

### But, surprisingly, the literature on remediation shows very mixed results. There have been hundreds of experiments which, instead of fortifying the idea that remediation is a sound practice for the disadvantaged student, make it clear that there is no agreement that remediation results in aggregate are efficacious – some are and some aren't. For example, many fledgling college students find statistics a daunting topic and common sense would suggest that a remediation process beforehand would be useful, yet a recent article titled "Reforming remediation: college students mainstreamed into statistics are more likely to succeed.", concluded that remediation was not valuable and the student should be immediately inducted into the class environment without extra training. [34]

Another study, published in 2020, examine the effect of remediation in both two-year and four-year colleges and concluded:

Our findings thus suggest that while many students may benefit from remedial education, a substantial number of students struggle with remedial coursework and fail to realize the intended benefits. [35]

These two examples, a minute fragment of this burgeoning literature, indicate that what some might feel is the obvious answer to perplexing difficulties we have described-- that is, extensive, free training and coaching of students before the academic experience--is far from a universal answer.

To sum up, the COVID-19 pandemic affected disadvantaged college students more severely than others, accentuating a gap that had already been widening – more than a digital divide, a digital chasm. The first step to alleviating this problem is more awareness and discussion at policy levels: academic administrators, university officials, legislators, etc. The policy solution will probably involve a combination of greater funding for some of the obvious deficiencies like equipment, bandwidth, special software, etc. plus a much greater effort to craft online learning materials so that they are more cognizant of the students who are more disadvantaged. Finally, despite the relatively pessimistic findings of remediation studies over many years, it will be crucial to find ways to intervene in the learning process to give every student the kind of early support that will really make a difference. If this were to happen, postsecondary education could become a much fairer playing field for the students who are on the edge of qualifying and just need a few special kinds of help in order to draw equal with their more technology-savvy classmates.

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