INFORMATION SYSTEMS EDUCATION JOURNAL

Volume 23, No. 1
January 2025
ISSN: 1545-679X

In this issue:

iscap
Information Systems & Computing Academic Professionals

The **Information Systems Education Journal** (ISEDJ) is a double-blind peer-reviewed academic journal published by **ISCAP** (Information Systems and Computing Academic Professionals). Publishing frequency is five times per year. The first year of publication was 2003.

ISEDJ is published online (https://isedj.org). Our sister publication, the Proceedings of the ISCAP Conference (https://iscap.us/proceedings) features all papers, abstracts, panels, workshops, and presentations from the conference.

The journal acceptance review process involves a minimum of three double-blind peer reviews, where both the reviewer is not aware of the identities of the authors and the authors are not aware of the identities of the reviewers. The initial reviews happen before the ISCAP conference. All papers, whether award-winners or not, are invited to resubmit for journal consideration after applying feedback from the Conference presentation. Award winning papers are assured of a publication slot; however, all re-submitted papers including award winners are subjected to a second round of three blind peer reviews to improve quality and make final accept/reject decisions. Those papers that are deemed of sufficient quality are accepted for publication in the ISEDJ journal. Currently the target acceptance rate for the journal is under 35%.

Information Systems Education Journal is pleased to be listed in the Cabell's Directory of Publishing Opportunities in Educational Technology and Library Science, in both the electronic and printed editions. Questions should be addressed to the editor at editor@isedj.org or the publisher at publisher@isedj.org. Special thanks to volunteer members of ISCAP who perform the editorial and review processes for ISEDJ.

INFORMATION SYSTEMS EDUCATION JOURNAL

Editors

Examining Impacts on Digital Discrimination, Digital Inequity and Digital Injustice in Higher Education: A Qualitative Study

Rachida F. Parks
rachida.parks@qu.edu
Business Analytics and Information Systems

Amy KB Paros
amy.paros@qu.edu
Management Department

Quinnipiac University
Hamden, CT 06518 USA

Mariama Yakubu
myakubu@newhaven.edu
Fire Science and Emergency Management Department
University of New Haven
West Haven, CT 06516 USA

Abstract

Amidst escalating global crises, universities and colleges are becoming increasingly digitalized to respond to evolving educational demands. However, technology and digitalization are also introducing new forms of inequality and extending existing disparities. The purpose of this study was to investigate these disparities, their impact on education, and how academic institutions' responses during the COVID 19 crisis further impacted these disparities and inequalities. We used a grounded theory approach with an interpretive epistemology which is appropriate and well suited for this study. We interviewed 24 informants holding university leadership and decision-making positions, including deans, IT managers, university presidents, provosts, and chief information officers. Public and private universities, historically black colleges and universities (HBCU), and minority institutions were represented. Our findings showed that digitalization of learning and institution processes expanded gaps in digital access, equity, and socio-economic status. The findings also supported that some universities proactively implemented best practices that extended beyond investing in digital infrastructure to include initiatives to support equity, inclusivity, and accessibility. The outcome of the study can inform evidence-based decision making, develop targeted crisis interventions, and advocate for systemic changes that promote an equitable and inclusive digital learning environment.

Keywords: Digital discrimination, digital equity, socio-economics, digital injustice, grounded theory (GT), education

Recommended Citation: Parks, R., Paros, A., Yakubu, M., (2024). Examining Impacts on Digital Discrimination, Digital Inequity and Digital Injustice in Higher Education: A Qualitative Study. *Information Systems Education Journal,* 23(1), pp. 54-69.
https://doi.org/10.62273/CBZW4487

Examining Impacts on Digital Discrimination, Digital Inequity and Digital Injustice in Higher Education: A Qualitative Study

Rachida F. Parks, Amy KB Paros and Marima Yakubu

1. INTRODUCTION

Organizational dependence on information technology is ever increasing, especially in times of crisis, like the COVID-19 pandemic (Wang & Wu, 2021). Organizations that can acquire and implement innovative technologies needed to respond during crisis are able to gain competitive advantage (Berman, 2012). Digitalizing organizational processes are expected to have a myriad of both long- and short-term benefits (Matt, Hess, & Benlian, 2015). The health crises caused by the pandemic created a dire necessity for increased digital capacity and innovation for higher education institutions' survival. (Benavides, Tamayo Arias, Arango Serna, Branch Bedoya, & Burgos, 2020).

While the digitalization of academic institutions has brought significant opportunities, it also introduced new forms of inequalities (Devlin, 2013). During the pandemic crisis, universities and colleges had to swiftly shift to online learning platforms. However, limited or no access to internet connectivity or to computers disproportionally affected lower socio-economic status (SES) students, faculty, and staff, thus uncovering digital discrimination and potentially widening existing disparities (Shohel, Ashrafuzzaman, Ahsan, Mahmud, & Alam, 2021). Without digital inclusion, academic stakeholders may face discriminatory access to work and educational opportunities thus exacerbating existing inequalities (Istenič, 2021; Van Deursen & Van Dijk, 2019). Current research calls for more actions to investigate these issues (Gran, Booth, & Bucher, 2021). It is critical to ensure that these stakeholders have equal access to digital resources and technology.

This study examined the extent or presence of digital discrimination, digital inequity, and socio-economic disparities within higher education institutions, during crises such as COVID. This study intends to bring awareness and to support inclusive attitudes and foster equity in an increasingly digital world.

2. BACKGROUND

Consistent with grounded theory (GT), our literature review took place during the data gathering and analysis. As such, we focused on several main themes that align with our study: (1) effects of crisis on educational institutions, (2) socio-economic impacts in education, (3) digital discrimination and technology access in higher education, and (4) digital inequity in education.

Effects of Crises on Educational Institutions

Crises—from emergency to catastrophe—effect organizations differently and the impact depends on their pre-event performance (Hiramatsu & Marshall, 2018). Research looks at how crisis affects organizations spanning from minor disruptions (Brenkert, 2010; Giannetti & Wang, 2016) through disasters, and global pandemics (Sydnor, Niehm, Lee, Marshall, & Schrank, 2017). Kato and Charoenrat (2018) concluded that having access to less institutional resources contributes to small and medium scale organizations suffering disproportionately. Impacts during crisis are largely related to revenue reduction (Aladejebi, 2020; Doern, 2016), disruption in operations (Omar, Ishak, & Jusoh, 2020), and losses in the workforce (Caminsky, 2020). Like any other business, higher education experienced significant operational and financial impacts during the COVID-19 pandemic (Hamouche, 2020). The effects of crises on higher educational institutions are arguably not uniform, some of the more wealthy colleges and universities see less operational impact than other institutions with lower available capital (Geiger, 2010; Sezen-Barrie, Carter, Smith, Saber, & Wells, 2023). Depending on the crises, publicly funded universities would have a different impact compared to private universities. According to Charoensukmongko and Phungsoonthorn (2021), private international universities were the hardest hit due to travel bans and movement restrictions (Sahu, 2020).

Looking at crisis impacts on education more broadly, Di Pietro (2018) found that students' academic performance and probability of graduating on time was reduced while dropout rates increased for students at University of

L'Aquila during a devastating earthquake. These effects fall back on the educational institutions' enrollments and revenue levels—requiring employee dedication, mitigation planning, and decisive leadership (Piotrowski & Vodanovich, 2008).

Socio-economic Impacts in Education

There has long been discussed a strong correlation between SES and educational level achieved (Anlimachie & Avoada, 2020). As artificial intelligence, data driven computing, business analytics, and technology know-how demands increase across the workforce, educational institutions have been expected to increase coursework focus to include digital technologies (Murphy, 2020). The relationship between SES and technology careers grows from access and equity during student training and education. Devlin and McKay (2014) reported that universities and students together are mutually responsible to help lower SES students bridge the transition into higher education. Additionally, true inclusive teaching and course design extends to a multitude of diverse students including disadvantaged SES (Wijeratne et al., 2022).

Murphy (2020) found that access to digital technology coursework was least available in the lowest SES areas due to the cost associated with purchasing and maintaining the equipment required for such subjects. Additionally, SES was found to positively corelate with academic performance in subject areas of technology, math, and science. Once students from lower SES enter college, Devlin (2013) noted that social and cultural barriers made the transition into universities more difficult for this population than their higher SES counterparts. Because of life situational changes associated with entering higher educational institutions weighed greater on students from lower SES, the transition can impact student motivation and confidence at school (Christie, Tett, Cree, Hounsell, & McCune, 2008). E-Learning has been seen as a tool to help lower SES students navigate the transition to university and better develop their personal and professional identity (Kaniadakis & Padumadasa, 2022).

These trends are being recognized as digital justice issues since poorer access to design, technology, and science courses for lower SES students makes it more challenging for them to pursue careers in technical fields (Murphy, 2020). Government is responsible for balancing the sometimes contradictory elements of social equity and budget constraints. For example, social equity initiatives require the commitment of financial resources, while fiscal responsibility remains an important responsibility of governments (Anlimachie & Avoada, 2020). Even life expectancy and health have been linked to the combination of SES and education levels (Enroth et al., 2022). SES and educational levels are positively correlated with involvement in government, education and public rights resulting in systemic advantages (Anlimachie & Avoada, 2020).

Digital Discrimination and Technology Access in Higher Education

With the COVID-19 driven shutdown of schools, the education of more than 290 million students globally has been disrupted and availability of digital technologies became the key for continuous education (UNESCO, 2020). George, Ward, and Jones stressed the importance of availability to digital technologies as a means for students and educators to continue engaging in learning; However, "There have been stark and widespread inequities in the availability and quality of digital technologies for education" (2022). Digital discrimination is defined by existing literature as the lack of access or reduced access to modern information and technology, including both software and hardware (Weidmann et al., 2016; Shohel et al., 2021; Gran, Booth, & Bucher, 2021). The COVID 19 pandemic has exacerbated this disparity and highlighted the need for more focus on digital inclusion.

Weidmann et al. (2016) confronted the opposition to digital inclusion as digital discrimination where individuals "suffer from reduced access to modern information and communications technology". Existing research including Australian Digital Inclusion Index, CISCO Country Digital Readiness, ITU Digital Access Index, The Economist Inclusive Internet Index, and the World Bank Digital Adoption Index have explored digital inclusion efforts. There still is disagreement on how it should be measured (Ochoa & Nonnecke, 2019). In education, there is increasing interest in inclusion, including digital inclusion (Lang, Freeman, Kiely, & Woszczynski, 2022). Moreover, the Sustainable Development Goals (SDGs) gathered by the 2030 Agenda adopted by the United Nations calls for more practical efforts to pursue a more sustainable path towards inclusive and equitable growth (Perales Jarillo, Pedraza, Moreno Ger, & Bocos, 2019). Digital inclusion, or the contrary reducing digital discrimination, should become a strategy to not only close the digital gaps at the local level but also promote digital inclusion at the international level.

The commonly used 'digital divide' also represents a form of inequality in terms of accessing data, information, including education through new technologies (Lythreatis, Singh, & El-Kassar, 2022). The gap between digitally included and excluded students is substantial and widening for some groups (Jaggars et al., 2021). COVID-19 has been highly disruptive and many students were excluded due to both formative (devices, infrastructure, and connectivity) and substantive forms of digital divide (interaction and engagement) (Liu, 2021).

Digital Inequity in Education

As internet access grows it becomes evident that aspects related to *using* information and technology continue to widen the digital divide (Lebeničnik & Istenič Starčič, 2020). Providing access to technology does not simply close the digital divide, but coupling access with training and the knowhow to extract information is equally as important (Hargittai, 2002). Access to technology systems, opportunities to learn and use technology, and costs associated with maintaining access to technology and systems influences the digital divide (Istenič, 2021; Van Deursen & Van Dijk, 2019). While pricing and convenience have contributed to the growing use of mobile devices, smartphones do not improve the digital divide because of memory, storage, speed, and application limitations (Mossberger, Tolbert, & Hamilton, 2012)

Students who lacked access to technology needed for course content, during times of crisis, worried about future impacts and cumulative curriculum implications (Krishnakumar et al., 2022). Maximized by conditions of crisis, psychological aspects, low self-efficacy, and lack of confidence with computer skills can deepen the digital divide across student populations (Lythreatis et al., 2022). Student inequities associated with technology and internet access were common, however, sometimes other digital divide issues like a student's inability to turn on a camera or microphone due to in-home circumstances impacted faculty-student relationships and even the student-student sense of community (Goin Kono & Taylor, 2021). The digital divide impacts many demographic categories, and it is important to recognize technology constraints associated with digital learning resources that can have an impact on disabled students (Lebeničnik & Istenič Starčič, 2020).

There has also been information technology and digital effectivity research around course effectivity (Adedoyin & Soykan, 2023), learning outcome achievement (Bozkurt & Sharma, 2020) and student engagement (Pittaway, 2012). Faculty presence and engagement in the online learning classroom can have significant positive impacts on learning engagement, community connection, and course understanding for first generation and students of color (Salvo, Shelton, & Welch, 2019). When faculty were highly engaged in professional development their fluency with digital teaching and learning systems improved (Pandya, Patterson, & Cho, 2022).

3. METHODOLOGY

This study adopts an interpretive qualitative research method to investigate disparities of digital discrimination, digital inequity, and socio-economic disparities within higher education institutions. Trauth (2001) presented five factors influencing the choice of qualitative research: the research problem, the researcher's theoretical lens, the degree of uncertainty surrounding the phenomenon, the researcher skills, and, finally, the academic politics. These factors align with why we embraced a qualitative study; it starts with the intricacies of the research problem, the degree of uncertainty during COVID crisis, our expertise in qualitative research especially in grounded theory methodology, and the turbulent academic politics during the pandemic. Moreover, the theoretical lens we embraced reflects our philosophical assumption central to qualitative inquiry (Creswell & Poth, 2016). This consists of embracing a subjective ontology, an interpretive epistemology, qualitative rhetorical and terminologies, and an inductive approach methodology (Creswell & Inquiry, 1998). Therefore, a grounded theory approach with an interpretive epistemology is appropriate and well suited for this research (Corbin & Strauss, 2008; Trauth, 2001).

Data Collection

Data collection efforts spanned across 16 months collected from 24 informants holding leadership positions at higher academic institutions. Interviews averaged 65 minutes and were conducted by all authors in pairs. Informants included university presidents, provosts, university vice presidents, university chief information officers, associate provosts, deans, university technology directors and equity and inclusion cabinets. The institutions included nine private and nine public universities and colleges in the United States while also ensuring small, medium, and large enrollment representation ranging from 1,500-38,000. Additionally, three historically Black colleges and universities (HBCUs) and minority-serving institutions were also included. We used snowball technique to

connect with informants until we reached saturation where themes became redundant and no new concepts identified (Corbin & Strauss, 2008). We also followed a theoretical sampling approach where the emerging theoretical model drove our data collection (Strauss & Corbin, 1990).

Our study was prompted and initiated in response to the COVID-19 crisis. This period presented a unique, albeit challenging, opportunity for real-time data collection, offering insights that were immediately relevant rather than retrospective. We recognized the importance of a broader data collection approach. However, this timing also imposed constraints on our participant pool, notably affecting our ability to engage with a broader demographic, including students, parents, and professors, due to the tragic circumstances of the pandemic and the loss of lives it entailed. Even when limited to administrators, some interviews had to be cut short to respect the severity of the situation (e.g., an administrator describing the dorms turning into a morgue).

Data Analysis

As with grounded theory, data collection and data analysis occurred simultaneously (Parks, Xu, Chu, & Lowry, 2017; Urquhart, Lehmann, & Myers, 2010). Our data coding and processing applied first order concepts, second order themes, and aggregate dimensions (Gioia, Corley, & Hamilton, 2013).

First order analysis began with applying an inductive approach through open coding, meaning the labels that we used were drawn from the interviewers' words and no-apriori codes were applied. Axial coding followed in order to develop higher level categories (Corbin & Strauss, 2008). Second order themes included selective coding, which involves selected codes to generate categories and core categories (Adolph, Kruchten, & Hall, 2012). Categories were then integrated into a coherent theoretical framework where both constant comparison and saturation are fulfilled. Having embraced the constant comparative method, we continued looking for information until the categories were saturated (Glaser & Strauss, 1967).

Literature was reviewed during data collection and analysis, while the authors also heavily invested in a rigorous interpretation of the data by engaging interrater reliability (IRR) to understand the phenomenon being studied. We conducted IRR at a rate of 30% of the collected data, more than the 20% recommended by Syed and Nelson (2015) and completed it throughout various phases of data collection. When misalignment arose between two coders, interrater agreement techniques of discussion, clarification of intervention of the third coder were used. To ensure trustworthiness, we used the criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). The assessment conducted indicates that the study results are credible, can be transferred to other contexts, and are consistent and confirmable. A detailed description and assessment of each criterion are provided in Appendix A.

4. FINDINGS

Figure 1 provides a visual in support of understanding and connections between our data and the findings. Details about findings are provided below and supported with informant quotes.

Challenges

While COVID-19 was the crisis used in this sample, we considered open questions to understand the overall impacts associated with large-scale crises. The data collected showed three challenges: (1) information technology challenges, (2) budgetary constraints, and (3) inequities and socio-economic challenges. We highlight these crisis challenges and will share findings using informant direct quotes.

Information Technology Challenges

The lack of proper access to hardware and software during crises can be a major challenge with navigating survival solutions. Faculty, staff and students found proper access to information technology and other technical resources was limited or unavailable. Our data collection identified technology challenges that impacted universities' ability to deliver learnings and operational objectives. Access to laptop computers was an essential challenge for university leaders. Some situations of crisis require virtual work environments, which needed the faculty and staff to have access to laptops and portable devices. Additionally, access to computers was an issue that also extended to the faculty because so much of student learning required access to labs and library software. This all happened at a time when the computer supply chain was overwhelmed. Also, while access to portable computers was a challenge, informants also identified challenges associated with internet access required to complete school and work.

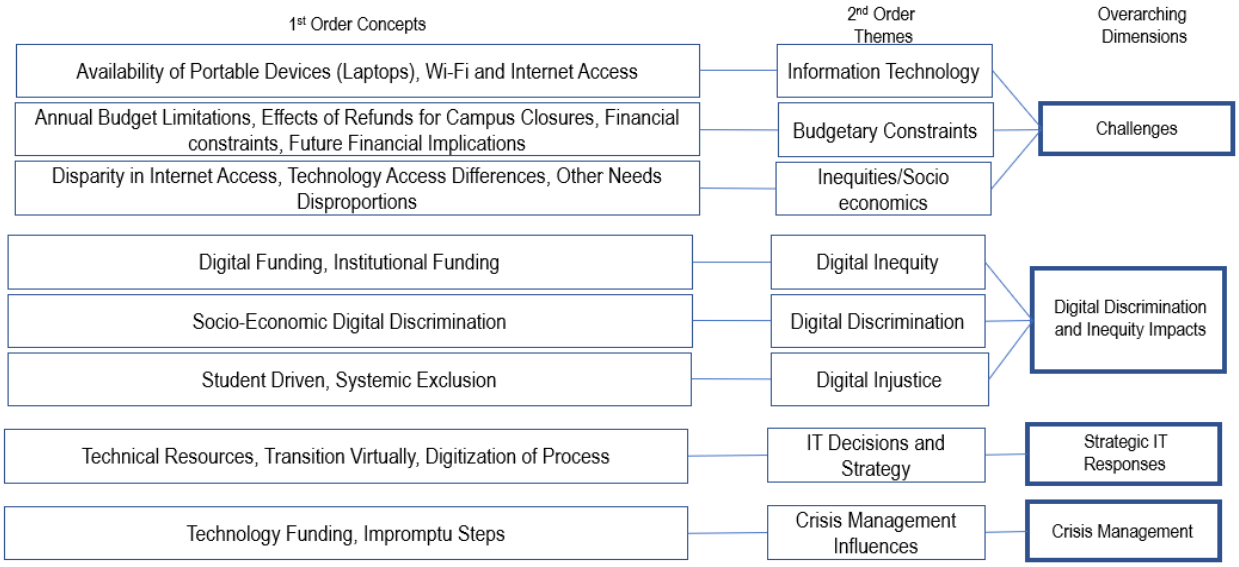

Figure 1: Emergent Concepts, Themes, and Dimensions

Our data collection uncovered digital discrimination promoting the digital divide. Some informants shared stories where they purchased hot spots for students, faculty, and staff. Table 1 provides direct quotes from informants identifying the indications of the effects on information technology.

Manifestations	Illustrative Quotes from Interviews
Availability of Portable Devices (Laptops)	"Desktops are cheaper than laptops… So in 9 times out of 10 that meant we bought them a desktop…That's a great idea, until we have to move out" #11
Wi-Fi and Internet Access	"I think people were shocked when kids went home, and they didn't hear from them anymore. I think people were like, "what do you mean everyone doesn't have Wi-fi at home? What do you mean everyone doesn't have a laptop?" … I think the pandemic has really opened people's eyes to see there's a digital divide." #23

Table 1. Manifestations and Illustrations of Information Technology Challenges

Budgetary Constraints

Many crises come with financial challenges in addition to the other stressors of the crisis situation. Financial constraints manifested into the following themes: annual budget limitations, refunds for campus closures, financial constraints, and future financial implications. While higher educational institutions were already in financially strained situations of crisis add even more challenging financial pressures. In our study's crisis COVID-19 example specifically, requirements to close campuses and move coursework online meant a direct financial implication associated with on campus fees (i.e. room and board). Institutional leaders interviewed shared various combinations and levels of financial tightening that included hiring freezes, furloughs, layoffs, elimination of faculty travel and research stipends, and freezes on retirement contributions. Table 2 provides direct quotes from informants identifying the indications of budgetary constraints.

Manifestations	Illustrative Quotes from Interviews
Annual Budget Limitations	"We figured out that we were going to need to add $26 million to our budget in order to make it through the next year. Since we already had a budget, that meant we had to strip $26 million from our budget to pay for the things that we wanted." #20
Effects of Refunds for Campus Closures	"We had to refund also the students that were living on campus. We refunded their resources for room and board" #19
Financial Constraints	"I've had a tough time but some of my colleagues at the <anonymized>, they're really in in uncharted waters. The chancellors at all the <anonymized> were told they had a week to come up with two plans: one a 25% cut and the other a 50% cut." #7
Future Financial Implications	"We actually had a very successful final three months of the fiscal year with donors, because we had an effective outreach to them and engaged them appropriately." #6

Table 2. Manifestations and Illustrations of Budgetary Constraints

Inequities and Socio-economic Challenges

Limitations or lacking personal resources during a crisis can result in inequities and socio-economic differences for students, faculty, and staff. The inequities seen in our study were manifested into three subcategories: disparity in internet access, technology access differences, and other needs disproportions. Our findings showed that when crisis operations require remote work, teaching, and learnings than challenges associated with internet access impacted students, faculty, and staff. Other challenges associated with remote work and learning included a lack of computer systems, hardware, and software at home. This is because some students, faculty, and staff were reliant on university resources. During the crisis studied in our research, higher educational institutions that instated virtual responses drove socio-economic challenges and inequities beyond even just internet and computer system access. Some universities shared that a portion of their student body relied on campus to be a safe haven that provided shelter and food during the academic year. Therefore, having to implement the move towards virtual campus and sending students off campus could challenge more than their academic success, but also their survival. Table 3 provides direct quotes from informants identifying the indications of inequities and socio-economic challenges.

Manifestations	Illustrative Quotes from Interviews
Disparity in Internet Access	"Students often did not have technology at their homes." #13
Technology Access Differences	"They were overwhelmed because they were working at home with family members and siblings who were either impeding their time or space to try to study. Or overwhelmed because they didn't have the proper tools to do this. They didn't have laptops with cameras or they were in a house with five other kids going to school, so the bandwidth wasn't there for them to get on the Internet." #22
Other Needs Disproportions	"I think that this pandemic has shown the inequities in our economic situation. Where more black and brown people are essential employees without a central pay and put at risk, showing the inequities in our healthcare system...Showing inequity in our education system. Primarily through the idea of technology, that not all areas have the same technology, not al households have more than one computer...You got incredibly motivated young people who want to learn who suddenly don't have the ability to do that." #20

Table 3. Manifestations and Illustrations of Inequities and Socio-economic Challenges

Digital Discrimination, Injustice and Inequity Impacts

Our findings portrayed the energy regarding the magnification of unresolved issues associated with inclusivity/discrimination, equity/inequity, and accessibility within higher education magnified during periods of crisis. Our data showed three major manifestations: (1) digital inequity, (2) digital discrimination, and (3) digital injustice. These major manifestations are closely connected and therefore we have provided the illustrative quotes for all manifestations within Table 4. Technology influences success and

creates competitive advantages, however, we also saw the countereffects of less technology access, reduced technical systems training, and decreased software availability. These situations are exacerbated by crisis and extend the digital divide across universities while centering on a lack of digital equity (digital inequity) that affects universities, faculty, staff, students, and families. The digital inequity theme is associated with digital funding and institutional funding manifestations. The subtheme of digital funding came to light with consideration for adequate schools, labs, equipment, and faculty across regions. Institutional funding, as a subtheme, looked at situations associated with unequitable funding for universities traditionally focused on serving underrepresented populations. Technology-based discrimination was reflected by the manifestation of socio-economic digital discrimination. Digital discrimination focuses on the lack of access or reduced access to software and hardware. Like other emergencies, the COVID-19 crisis forced students, faculty, and staff to leave campus. This situation highlighted issues associated with the digital divide, digital inclusion, and digital discrimination. Once campuses were closed, students, faculty, and staff no longer had access to any on-campus resources including information and technology. As described by our informants, transitioning away from campus reduced access and exacerbated issues associated with digital discrimination. The subthemes of student driven and systemic exclusion represent the manifestation of digital injustice. Student driven, considered both internal aspects of diversity at universities and externally focused on involvement in justice movements. The systemic exclusion subtheme looked to transparently show the multifaceted findings associated with students and effects on faculty pertaining to challenges associated with affording university tuition and faculty review procedures. Table 4 provides direct quotes identifying the indications of digital inequity, digital discrimination, and digital injustice the informants faced.

Manifestations	Illustrative Quotes from Interviews
Digital Inequity	
Digital Funding	"The allocation of funds are not always equitable to smaller universities or universities that are not – that service minority students or alternative population. Even with that when you have universities that have this kind of equity gap in terms of the funding, that also impacts the amount you can pay your staff to be able to do this. Most small universities are not going to have a first class technologist to come and do this. Small universities are not going to attract the type of talent to be able to do that." #23
Institutional Funding	"Most HBCUs have the lowest tuition rates in the state. We don't have the money. We're always trying to do more with less. We don't charge enough. Everybody here is taking a discount. I'm the lowest paid <anonymized>. Most of our faculty members are not paid what their colleagues at another institution are paid." #20
Digital Discrimination	
Socio-Economic Digital Discrimination	"Some were taking the classes in bathrooms because that's the only space they could find privacy. We had initially required that all students had to turn the cameras on. We got push back from the students saying "I'm not comfortable with that." … There are all kinds of social economic issues that we need to get better about that weren't considering up front, but we were able to adjust as we move forward then." #22 "So, students often did not have technology at their homes. We started our own philanthropy donation" #13 "We have a significant population of the campus community that's food insecure.

	Which very well means that there's also a lot of students don't have enough access to technology at home, whether it's internet and computers. All those things are, unfortunately, interconnected." #17
Digital Injustice	
Systemic Exclusion	"We haven't really talked about what systemic racism exists in our Institutions of higher education and across the country…We need to look at our policies and procedures. There are some far more traditional hierarchical structures that have to change…We have to look at how resources are managed and how the sources are made available. I mean, for us, that's a lot of legislative advocacy, a lot of policy changes that are required, both at the state level, the federal level, but then again on our own campuses. So, it's actually a really exciting time to create change." #21
Student Driven	"<anonymized> has a very long history of being a leader in social justice…Our students have a have a tendency or attention to move towards social justice issues when they arise. Because were in Covid, we haven't had students who would be actively engaged on campus level, but we have had faculty who've tried to pull students into that realm." #22

Table 4. Manifestations and Illustrations of Digital Discrimination, Injustice, and Inequity Impacts

Crisis Management Influences

Intervention of crisis management or a lack thereof influenced digital access. In essence, intentional crisis management made a difference between creating equitable digital access on one hand and worsening the situation for those who already lacked digital access. Crisis management influences manifested into the following themes: technology funding and impromptu steps. Crisis management interventions that provided funding for technology led to wider access for teaching and learning, thereby mitigating the impact to any prior deprivation. Some of the crisis management interventions were direct, situational, and impromptu geared towards universal benefits of teaching and learning instructions, such as ensuring students' attentiveness in virtual classes during the height of the pandemic—the absence of which would negatively impact digital learning. Table 5 provides direct quotes from interviewees illustrating influences of crisis management interventions.

Manifestations	Illustrative Quotes from Interviews
Technology Funding	"I think the computer stipend, which was a genius move on my chief of staff, that was his idea. I think we'll do some form of that every semester. We'll either up our technology fee or get a grant, but we will provide some level of technology stipend, so that every student has something. Even though we haven't done a lot of hybrid yet because most of our stuff has been totally remote, I think in the new world hybrid is going to be the norm. #20
Impromptu Steps	I made sure to tell the faculty be on the lookout for kids who are either not turning the cameras on or not coming to class on a regular basis and give us those names. We fed those names to the student affairs office who did outreach to the students to kind of be ahead of the curve with regards to what their issues might be. We were trying to be as proactive as we could and making those types of decisions. Admittedly, it was really ad-hoc. We were kind of making it up on the fly. There was no structured approach. #22

Table 5. Manifestations and Illustrations of the Crisis Management Influences

IT Decisions and Strategy

The stressors of a crisis make those IT decisions and strategies more impactful to the educational system. IT decisions and strategy manifested into the following themes: technology resources, transition online, and unintended technology inequities. Access and availability to technology positively supported decision making and response options. Also, institutions with resources to adapt technology found the crisis as an accelerant enabling more responsive acceptance and inclusion of technological solutions. These preceding findings aligned with access to resources that allowed for the implementation of technology, which made findings associated with a lack of access that much more important. In some cases, universities working to enlist IT solutions found that students, faculty, and staff did not have the means to utilize technology and virtual options.

Table 6 provides direct quotes from informants identifying the indications of the IT decisions and strategy.

Manifestations	Illustrative Quotes from Interviews
Technical Resources	"I think several of these there are advantages to being part of a 20+ [quantity generalized for confidentiality] campus system. Because, a lot of the technology that we use across our campuses are the site licenses negotiated on Chancellor's Office level…I think there are lots of advantages, again, because we have the capacity of the entire [removed for confidentiality] to anticipate." #21
Transition Virtually	"Knowledge and the digitization of processes, I think have accelerated and will accelerate. The crisis from that perspective is welcome now, because some of these needed to happen. The brick-and-mortar universities are never going to go away, but they need to be more responsive to technologies." #8
Digitization of Processes	"We talked about mobile first. We talked about being agile, we talked about digital transformation." #14 "We had previously used an e-sign type tool at a smaller scale and it was cost effective. But as soon as the volume exploded very quickly, where everyone, all of a sudden needed to get signatures for things virtually, we migrated to a different tool that was just more cost effective." #16

Table 6. Manifestations and Illustrations of IT decisions and strategy

5. Emerging Framework Understanding Digital Resiliency, Inclusion, and Equity

While our themes may seem straightforward, how they emerged and interacted with each other did not follow a linear trajectory. Through constant analysis, major categories were identified – challenges, responses, and impacts. Close analysis of the data uncovered interrelations among these categories, facilitating their integration into a cohesive theoretical framework (Strauss & Corbin, 1998). This paper proposes a framework for the Crisis Impacts on Digital Equity and Inclusion (CIDIE), as illustrated in Figure 2. This framework connects the emerging themes and contributes to existing research by showing the interconnectedness and mediation between challenges, strategic responses, crisis management with impacts to digital discrimination, digital inequity, and expectations in digital justice.

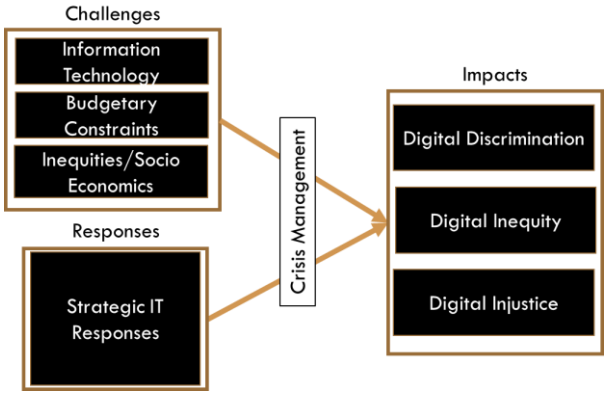

Figure 2: Framework of Crisis Impacts on Digital Equity and Inclusion

Challenges Pressure Learning Organizations (IT Challenges, Budgetary Constraints, Socio-economics)

The extent to which organizational IT challenges brought forth by crisis—negatively or positively—impact stakeholders and their performance levels depend largely on management's strategic response to a crisis. Educational institutions' leverage of effective crisis management leads to digital inclusion or digital discrimination on the other hand if response strategies do not take into consideration their marginalized population. However, pre-existing budgetary constraints of educational institutions are drawback to the influence of crisis management on digital justice/discrimination. Tight budgetary measures do not allow for adequate investment in the IT resources needed for providing digital equity to the underserved community. Crisis management that factors in socio-economic challenges of all stakeholders and the impacts they may have on productivity reduces digital inequity, such as providing hot spots and/or computers for students and employees who for socio-economic reasons do not have adequate IT resources to perform during crisis.

Strategic IT Responses

There is no doubt that technical resources largely supported how academic institutions responded during the pandemic (Cagin & Senvar, 2022). Such resources allowed university operations and education to transition online and maintain some business operations. The survival of educational institutions during time of crises depends largely on exploring innovative technical approaches to repurpose delivery of teaching and education, utilization of by-products, application of data, and

integration of technology (Davenport, Godfrey, & Redman, 2020; Von Krogh, Kucukkeles, & Ben-Menahem, 2020). The proactive and strategic IT responses to pivot to virtual platforms were critical especially when taking in consideration those with limited resources and no access to technology. However, IT Responses that prioritize addressing issues of inequity play a critical role in controlling the disparities in access, needs and affordability (Murphy, 2020). Therefore, organizations are more likely to contribute to a more equitable digital environment if they implement targeted strategies and responses. Like challenges faced by academic institutions, this relationship was also mediated by crisis management which is detailed in the next section.

Crisis Management Mediating Impacts on Digital Resilience, Inclusion, and Equity

How well a university or college manages a crisis influences inclusion/discrimination, and equity/inequality. Academic institutions' ability to leverage both financial and technical resources, balance socio-economic challenges and leverage information technology strategic responses enables or constrains that university during crisis. There is no doubt that institutional resources help contribute to an organization's resilience and the less institutional resources available the more crisis impacts can disrupt operations (Kato & Charoenrat, 2018). Of course, educational institutions who are already constrained by budgetary resources will also struggle more to offer cutting edge technology to faculty, staff and students. Access to online learning environments and skillsets prior to the crisis helped universities transition, but universities who serve lower SES areas are usually challenged financially and have less e-learning capability further straining digital resiliency (Anlimachie & Avoada, 2020; Murphy 2020; Devlin, 2013).

A lack of emergency preplanning or prior preparedness may have adverse impacts through inefficient resource use and unplanned investment in IT (Sing & Jain, 2022). Our study connected the influence of IT resources and impact of crisis challenges with effects associated with digital inclusion or discrimination and digital equities or inequities.

6. CONCLUSION

Educational institution responses to crisis challenges utilizing IT can have unintended impacts associated with digital equity, inclusion, and justice engagement. This study developed a framework for the digital effects of crises on digital learning inclusion and equity using qualitative interview data gathered during the actual crisis.

While this study's data set was limited to the United States, it sufficiently provides data from small, medium, and large sized, public, private colleges and universities with appropriate for HBCU representation. Future studies could expand the data set to explore unique circumstances involving HBCUs, and include perspectives from faculty, students, and parents in the interview data set.

This study notably advanced the fields of technology, education, and diversity research and practice. Most importantly, managerial implications of this study provoke college and university leaders to consider unintended digital inequities and digital discrimination while strategizing and implementing decision making during crisis.

7. ACKNOWLEDGEMENTS

Authors would like to acknowledge the scholarly grant support for this research provided by Quinnipiac University's M&T Bank Center for Women and Business.

8. REFERENCES

Adedoyin, O. B., & Soykan, E. (2023). Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive Learning Environments, 31*(2), 863-875. https://doi.org/10.1080/10494820.2020.1813180

Adolph, S., Kruchten, P., & Hall, W. (2012). Reconciling perspectives: A grounded theory of how people manage the process of software development. *Journal of Systems and Software, 85*(6), 1269-1286. https://doi.org/10.1016/j.jss.2012.01.059

Aladejebi, O. (2020). Managing small businesses in Nigeria during covid-19 crisis: impact and survival strategies. *IOSR Journal of Business and Management (IOSR-JBM), 22*(8), 24-34.

Anlimachie, M. A., & Avoada, C. (2020). Socio-economic impact of closing the rural-urban gap in pre-tertiary education in Ghana: context and strategies. *International Journal of Educational Development, 77*, 102236. https://doi.org/10.1016/j.ijedudev.2020.102236

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in

higher education institutions: A systematic literature review. *Sensors, 20*(11), 3291. https://doi.org/10.3390/s20113291

Berman, S. J. (2012). Digital transformation: opportunities to create new business models. *Strategy & Leadership, 40*(2), 16-24. https://doi.org/10.1108/10878571211209314

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian journal of distance education, 15*(1), i-vi.

Brenkert, G. G. (2010). The limits and prospects of business ethics. *Business Ethics Quarterly, 20*(4), 703-709. https://doi.org/10.5840/beq201020444

Caminsky, I. (2020). Covid-19: an opportunity to rethink wellbeing within construction. *Occupational Health & Wellbeing, 72*(11), 18-19.

Charoensukmongkol, P., & Phungsoonthorn, T. (2021). The effectiveness of supervisor support in lessening perceived uncertainties and emotional exhaustion of university employees during the COVID-19 crisis: the constraining role of organizational intransigence. *The Journal of general psychology, 148*(4), 431-450. https://doi.org/10.1080/00221309.2020.1795613

Christie, H., Tett, L., Cree, V. E., Hounsell, J., & McCune, V. (2008). A real rollercoaster of confidence and emotions: Learning to be a university student. *Studies in higher education, 33*(5), 567-581. https://doi.org/10.1080/03075070802373040

Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks, CA: Sage.

Creswell, J. W., & Inquiry, Q. (1998). *Research Design: Choosing Among Five Traditions*. Thousand Oaks, CA: Sage.

Creswell, J. W., & Poth, C. N. (2016). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Thousand Oaks, CA: Sage.

Devlin, M. (2013). Bridging socio-cultural incongruity: Conceptualising the success of students from low socio-economic status backgrounds in Australian higher education. *Studies in higher education, 38*(6), 939-949. https://doi.org/10.1080/03075079.2011.613991

Devlin, M., & McKay, J. (2014). Reframing 'the problem': students from low socio-economic status backgrounds transitioning to university. *Universities in Transition: Foregrounding Social Contexts of Knowledge in the First Year Experience*, 97-125.

Di Pietro, G. (2018). The academic impact of natural disasters: evidence from L'Aquila earthquake. *Education Economics, 26*(1), 62-77. https://doi.org/10.1080/09645292.2017.1394984

Doern, R. (2016). Entrepreneurship and crisis management: The experiences of small businesses during the London 2011 riots. *International Small Business Journal, 34*(3), 276-302. https://doi.org/10.1177/0266242614553863

Enroth, L., Jasilionis, D., Németh, L., Strand, B. H., Tanjung, I., Sundberg, L., Fors, S., Jylhä, M. and Brønnum-Hansen, H. (2022). Changes in socioeconomic differentials in old age life expectancy in four Nordic countries: the impact of educational expansion and education-specific mortality. *European Journal of Ageing, 19*(2), 161-173. https://doi.org/10.1007/s10433-022-00698-y

Geiger, R. (2010). Impact of the financial crisis on higher education in the United States. *International Higher Education*(59), 9-11. https://doi.org/10.6017/ihe.2010.59.8486

George, B., Ward, Y. D., & Jones, E. (2022). Digital Inequities and Digital Inclusion in Education: An Agenda for the Post-COVID-19 World. *Implementing Diversity, Equity, Inclusion, and Belonging Management in Organizational Change Initiatives,* 260-267.

Giannetti, M., & Wang, T. Y. (2016). Corporate scandals and household stock market participation. *The Journal of Finance, 71*(6), 2591-2636. https://doi.org/10.1111/jofi.12399

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods, 16*(1), 15-31. https://doi.org/10.1177/1094428112452151

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York, NY: Aldine

de Gruyter. https://doi.org/10.4324/9780203793206

Goin Kono, K., & Taylor, S. (2021). Using an ethos of care to bridge the digital divide: Exploring faculty narratives during a global pandemic. *Online Learning, 25*(1), 151-165. https://doi.org/10.24059/olj.v25i1.2484

Gran, A.-B., Booth, P., & Bucher, T. (2021). To be or not to be algorithm aware: a question of a new digital divide? *Information, Communication & Society, 24*(12), 1779-1796. https://doi.org/10.1080/1369118X.2020.1736124

Hamouche, S. (2020). COVID-19 and employees' mental health: stressors, moderators and agenda for organizational actions. *Emerald Open Research, 2*(15). https://doi.org/10.35241/emeraldopenres.13550.1

Hargittai, E. (2002). Second-Level Digital Divide: Differences in People's Online Skills. *First Monday, 7*(4). doi:10.5210/fm.v7i4.942

Hiramatsu, T., & Marshall, M. I. (2018). The long-term impact of disaster loans: The case of small businesses after Hurricane Katrina. *Sustainability, 10*(7), 2364. https://doi.org/10.3390/su10072364

Istenič, A. (2021). Shifting to digital during COVID-19: are teachers empowered to give voice to students? *Educational Technology Research and Development, 69*, 43-46. https://doi.org/10.1007/s11423-021-09956-9

Jaggars, S. S., Motz, B. A., Rivera, M. D., Heckler, A., Quick, J. D., Hance, E. A., & Karwisch, C. (2021). The Digital Divide among College Students: Lessons Learned from the COVID-19 Emergency Transition. Policy Report. *Midwestern Higher Education Compact*.

Kaniadakis, A., & Padumadasa, E. (2022). Can e-learning enable the transition to university for computing and electronic engineering students from low socio-economic status? A socio-cultural approach. *Journal of Information Systems Education, 33*(1), 87-97.

Kato, M., & Charoenrat, T. (2018). Business continuity management of small and medium sized enterprises: Evidence from Thailand. *International Journal of Disaster Risk Reduction, 27*, 577-587. https://doi.org/10.1016/j.ijdrr.2017.10.002

Krishnakumar, S., Maier, T., Berdanier, C., Ritter, S., McComb, C., & Menold, J. (2022). Using workplace thriving theory to investigate first-year engineering students' abilities to thrive during the transition to online learning due to COVID-19. *Journal of Engineering Education, 111*(2), 474-493. doi:https://doi.org/10.1002/jee.20447

Lang, M., Freeman, M., Kiely, G., & Woszczynski, A. B. (2022). Special Issue Editorial: Equality, Diversity, and Inclusion in IS Education. *Journal of Information Systems Education, 33*(1), 1-6.

Lebeničnik, M., & Istenič Starčič, A. (2020). Examining the contemporary digital divide of university students with specific reference to students with special educational needs. *British Journal of Educational Technology, 51*(6), 2422-2441. https://doi.org/10.1111/bjet.12920

Liu, J. (2021). Bridging digital divide amidst educational change for socially inclusive learning during the COVID-19 pandemic. *SAGE Open, 11*(4). doi:https://doi.org/10.1177/21582440211060810

Lythreatis, S., Singh, S. K., & El-Kassar, A.-N. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change, 175*(121359), 90-103. doi:https://doi.org/10.1016/j.techfore.2021.121359

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & information systems engineering, 57*(5), 339-343. https://doi.org/10.1007/s12599-015-0401-5

Mossberger, K., Tolbert, C. J., & Hamilton, A. (2012). Broadband adoption| measuring digital citizenship: Mobile access and broadband. *International Journal of Communication, 6*, 37.

Murphy, S. (2020). Participation and achievement in technology education: the impact of school location and socioeconomic status on senior secondary technology studies. *International Journal of Technology and Design Education, 30*(2), 349-366. doi:10.1007/s10798-019-09499-4

Ochoa, M., & Nonnecke, B. M. (2019). *Developing a Digital Inclusion Index at the State Level: The Case of Mexico.* Paper presented at the TPRC47: The 47th Research Conference on

Communication, Information and Internet Policy.

Omar, A. R. C., Ishak, S., & Jusoh, M. A. (2020). The impact of Covid-19 Movement Control Order on SMEs' businesses and survival strategies. *Geografia, 16*(2), 90-103. https://doi.org/10.17576/geo-2020-1602-11

Pandya, B., Patterson, L., & Cho, B. (2022). Pedagogical transitions experienced by higher education faculty members–"Pre-Covid to Covid". *Journal of Applied Research in Higher Education, 14*(3), 987-1006. https://doi.org/10.1108/JARHE-01-2021-0028

Parks, R., Xu, H., Chu, C.-H., & Lowry, P. B. (2017). Examining the intended and unintended consequences of organisational privacy safeguards. *European Journal of Information Systems, 26*(1), 37-65. doi:10.1057/s41303-016-0001-6

Perales Jarillo, M., Pedraza, L., Moreno Ger, P., & Bocos, E. (2019). Challenges of online higher education in the face of the sustainability objectives of the united nations: carbon footprint, accessibility and social inclusion. *Sustainability, 11*(20), 5580. https://doi.org/10.3390/su11205580

Piotrowski, C., & Vodanovich, S. J. (2008). Hurricane Ivan: A case study of university faculty in crisis management. *Organization Development Journal, 26*(2), 25.

Pittaway, S. M. (2012). Student and staff engagement: developing an engagement framework in a faculty of education. *Australian Journal of Teacher Education, 37*(4), 37-45. https://doi.org/10.14221/ajte.2012v37n4.8

Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus, 12*(4). DOI: 10.7759/cureus.7541

Salvo, S. G., Shelton, K., & Welch, B. (2019). African American males learning online: Promoting academic achievement in higher education. *Online Learning, 23*(1), 22-36. https://doi.org/10.24059/olj.v23i1.1390

Sezen-Barrie, A., Carter, L., Smith, S., Saber, D., & Wells, M. (2023). Research and Scholarship During the COVID-19 Pandemic: A Wicked Problem. *Innovative Higher Education, 48*(3), 501-525. https://doi.org/10.1007/s10755-022-09639-0

Shohel, M. M. C., Ashrafuzzaman, M., Ahsan, M. S., Mahmud, A., & Alam, A. S. (2021). Education in emergencies, inequities, and the digital divide: Strategies for supporting teachers and students in higher education in Bangladesh. In *Handbook of Research on Inequities in Online Education During Global Crises,* 529-553. DOI: 10.4018/978-1-7998-6533-9.ch027

Sydnor, S., Niehm, L., Lee, Y., Marshall, M., & Schrank, H. (2017). Analysis of post-disaster damage and disruptive impacts on the operating status of small businesses after Hurricane Katrina. *Natural Hazards, 85*(3), 1637-1663. https://doi.org/10.1007/s11069-016-2652-y

Syed, M., & Nelson, S. C. (2015). Guidelines for establishing reliability when coding narrative data. *Emerging Adulthood, 3*(6), 375-387. https://doi.org/10.1177/2167696815587648

Trauth, E. M. (2001). The choice of qualitative methods in IS research. In *Qualitative research in IS: issues and trends* (pp. 1-19): IGI Global. doi: 10.4018/978-1-930708-06-8.ch001

UNESCO. (2020). 290 Million Students Out of School Due to COVID-19: UNESCO Releases First Global Numbers and Mobilizes Response.

Urquhart, C., Lehmann, H., & Myers, M. D. (2010). Putting the 'theory' back into grounded theory: Guidelines for grounded theory studies in information systems. *Information Systems Journal, 20*(4), 357-381. doi:10.1111/j.1365-2575.2009.00328.x

Van Deursen, A. J., & Van Dijk, J. A. (2019). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society, 21*(2), 354-375.

Wang, W.-T., & Wu, S.-Y. (2021). Knowledge management based on information technology in response to COVID-19 crisis. *Knowledge management research & practice, 19*(4), 468-474.

Weidmann, N. B., Benitez-Baleato, S., Hunziker, P., Glatz, E., & Dimitropoulos, X. (2016). Digital discrimination: Political bias in Internet service provision across ethnic groups. *Science, 353*(6304), 1151-1155.

Wijeratne, D., Dennehy, D., Quinlivan, S., Buckley, L.-A., Keighron, C., & Flynn, S. (2022). Learning Without Limits: Identifying the Barriers and Enablers to Equality, Diversity, and Inclusion in IS Education. *Journal of Information Systems Education, 33*(1), 61-74.

Appendix A – Evaluating Trustworthiness

Evaluative criteria	Description	Study Evaluation
Credibility	Evaluation whether the study findings represent a credible interpretation of the data collected	We used multiple type of sources (such deans. University presidents, provosts, vice presidents, CIO), different institutions (such as public, private, historically Black colleges and universities) across multiple States to ensure triangulation of the findings.
Transferability	Applicability and extension of the study's findings beyond the bounds of the project	To ensure transferability, we provide a detailed first-order analysis (along with illustrative quotes) of the phenomenon and context which is supposed to provide enough background for the readers to judge the plausibility of the findings and their applicability beyond the bound of this project (Van Maanen 1979).
Dependability	Assessment of stability and consistency of the study's processes of data collection, data analysis, and theory generation	Dependability was achieved by conducting inter-rater reliability or interrater agreement techniques to develop a shared understanding of the phenomenon being studied. Although, the gold standard is that 20% of the data go through the inter-rater reliability (IRR), we conducted 30% at different phases of our data collections (Syed & Nelson, 2015).
Confirmability	Measurement of how the study findings is supported by the data collected	To measure how the findings are supported by the data collected, the study was shared with professors, executives, as well as executives outside academia, in order to get critical feedback. Consensus suggests that this research analysis and theoretical model accurately reflect the data