Challenges and Opportunities in Teaching Architecture Design Studio During the COVID-19 Era: an HBCU Perspective

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The first idea of design studio as a conventional pedagogical structure of architectural education dates back to 1819 in France as École des Beaux-Arts. Since then, the design studio has been considered a critical element and norm for architectural education and design practice to improve not only "artistic" but also "analytical- structural thinking skills." However, since March 2020, when governments enforced COVID-19 quarantine restrictions, the entire education system worldwide rapidly transitioned from face-to-face to online instruction. This global pandemic has created a significant pedagogical shift in delivering the traditional design studio instruction through the virtual classroom. While some programs have previously experimented and found success with online education, for most programs, with direct hands-on experiential learning, this transition was a new experience met with uncertainty and anxiety for both faculty and students.

This paper highlights the challenges and opportunities of this rapid online transition in architecture education by examining Howard University, a Historically Black College and University (HBCU). This institution has a 5-year architecture program that shifted to online instruction in March 2020 and will remain online through Spring 2021. This study explored related literature through a database search in addition to an extensive survey that targeted the design studio faculty and students. Through this survey, the authors evaluated the faculty and students' experiences as they navigated the traditional design studio in a virtual world. The survey also explored their perspectives regarding the relationship between an online environment, equity, and the digital divide. As has been widely covered, the health effects of COVID-19 have disproportionately affected people of color. Given this reality, the paper also explores how existing inequities have the potential to affect architecture students in the transition to the digital world. While the paper outlines the challenges that occurred during this shift, it also highlights opportunities for pedagogical changes in design studios at Howard University (and others) should online or hybrid instruction continue in the future.

1. INTRODUCTION

The closure of design studios in March 2020 in response to the COVID-19 pandemic posed a unique threat to architectural education globally. Face-to-face instruction in the design studio setting has been the primary pedagogical system in architectural education. Some schools have previously explored hybrid models where online tools supplement the in-person design studio as a physical space of ideas. However, very few schools in a pre-COVID world have explored fully online architecture programs as a disruption from the physical studio setting. For example, according to the Association of Collegiate Schools of Architecture (ACSA), there are only four schools with fully online programs (Lawrence Technological University, Boston Architectural College, Academy of Art University, and Southern Illinois University).[1] Therefore, when architecture programs moved online in March 2020, it signaled a new terrain in architectural education for professors and students alike. While challenging, this shift to online education has forced educators to make pedagogical shifts and rethink the foundation of architectural education.

While there are potential opportunities to be found in the shift to online education, there are also many challenges for professors, students, and administrators. However, the COVID-19 pandemic has disproportionately affected low-income populations and people of color. While the history of racial inequity in America that has exacerbated the effects of COVID-19 is beyond this paper's scope, this context outlines why it is important to focus on the HBCU perspective to understand challenges and opportunities encountered during the shift to online instruction. This analysis aims to unpack opportunities for rethinking pedagogy in HBCU design education, potentially addressing issues of equity, diversity, and the digital divide.

2. HBCUS AND DESIGN EDUCATION

The Higher Education Act of 1965 defines an HBCU as "any historically black college or university that was established prior to 1964, whose principal mission was, and is, the education of black Americans, and that is accredited by a nationally recognized accrediting agency or association determined by the Secretary [of Education] to be a reliable authority as to the quality of training offered or is, according to such an agency or association, making reasonable progress toward accreditation."[2] As of June 2019, there were seven NAAB

Average Institutional Graduation Rates Among HBCUs and Non-HBCUs, Based on Enrollment of Low-Income Students							
	Grad Rate Among Black Students		Number of Institutions		Average SAT		Average Percent Pell	
	HBCU	Non-HBCU	HBCU	Non-HBCU	HBCU	Non-HBCU	HBCU	Non-HBCU
Institutions with 40% -75% Pell Freshman	37.8%	32.0%	38	294	860	988	74.1%	50.4%
Institutions with 40% -65% Pell Freshman	41.8%	32.1%	17	277	920	992	54.5%	49.2%
Institutions with 65% -75% Pell Freshman	34.4%	30.3%	21	17	856	910	70.9%	70.7%

Figure 1. Average Institutional Graduation Rates Among HBCUs and Non-HBCUs, Based on Enrollment of Low-Income Students. Image credit: Redrawn from Education Trust.[34]

Accredited HBCU architecture programs. These are Howard University, Hampton University, Florida A and M University, Morgan State University, Tuskegee University, Prairie View A and M University, and University of the District of Columbia. These programs all play a crucial role in developing Black architects, push social justice issues through their design pedagogy while playing an essential role in the Black community. Historically, HBCUs offered training to African Americans in the associated fields of mechanical and industrial arts and building construction when access to higher education was otherwise unattainable. Programs such as those established in 1871 at Hampton University to more recent programs at Morgan State University (1971) educated a wealth of African American pioneers in the profession.[3]

Today, while HBCUs offer education to all students regardless of race, they serve a crucial role and significantly impact communities of color. For example, according to an Education Trust report entitled, "A Look at Black Student Success: Identifying Top-and-Bottom Performing Institutions," HBCUs enroll "approximately 15 percent of Black degree-seeking undergraduates and 20 percent of first-time, full-time Black students at four-year institutions."[4] This critical role is also highlighted in the graduation rates of HBCU institutions vs. non-HBCU institutions, where it was reported that HBCUs have higher success rates (6-year graduation rate for Black students) compared with other institutions serving similar populations.[5]

HBCUs have also played a critical role in serving low-income student populations compared to their non-HBCU counterparts. "Roughly half of the nation's 105 HBCUs have a freshman class where three-quarters of the students are from low-income backgrounds, while just 1 percent of the 676 non-HBCUs serve as high a percentage of low-income students."[6] Many of these students receive funding through Pell grants, a need-based financial aid mechanism for undergraduate students. According to the Education Trust report, when comparing institutions enrolling 40-75% Pell Freshman, HBCUs consistently graduated more black students than non-HBCU institutions (Figure 1).[7]

While HBCUs play a pivotal role in educating underrepresented communities of color, they often struggle to meet their peer institutions' resources and have smaller endowments than their non-HBCU counterparts. For example, "the cumulative endowment holdings for the HBCU sector is $2.1 billion. More than 50 predominantly white institutions on their own have more in endowment funds."[8] This financial disparity has been exacerbated due to the pandemic as colleges and universities nationwide have struggled with the financial implications of campus closures. While many HBCUs have received support from the Federal government, especially during the pandemic, many institutions remain underfunded as they aim to meet their students' needs during the shift to online education.

HBCUs play an equally important role in the architecture profession. According to the "2015 AIA Diversity in the Profession of Architecture Survey," African Americans make up 12 percent of the US population, but only 5 percent of those enrolled in Architecture schools are African American. Furthermore, only 2 percent of licensed architects identify as African American.[9] HBCUs contribute significantly to this percentage of licensed African American architects. As of a 2009 report, 35 percent of African American architects hold at least one degree from an HBCU.[10] Howard University provided nearly 17.3 percent of licensed African American architects.[11] As there are currently only 7 NAAB accredited HBCU architecture programs vs. 110 other accredited programs in the USA, it is clear that HBCUs play a pivotal role in educating African American architects and pushing the profession to meet its diversity, equity, and inclusion goals.

Given this context, it is clear HBCUs play a crucial role in educating and supporting black students, serve low-income populations, and play a pivotal role in diversity and inclusion within the profession. As studies have shown that low-income populations and communities of color have been more adversely affected by the pandemic, it is clear that a survey of HBCU institutions and the challenges they are facing in the shift to online design education is an important area of research.

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3. ONLINE DESIGN STUDIO IN THE PRE-COVID CLIMATE—A LITERATURE REVIEW

This study uses a comprehensive literature[12] review from relevant secondary sources (such as published research articles), that are specific and thorough to avoid outcome biases. To accomplish this, a search was conducted across three major databases (Google Scholar, ProQuest, Sage Premier). The inclusion criteria were based on search terms by incorporating several keywords such as Architecture, Virtual Design Studio, Virtual Classroom, Virtual Learning, Online Teaching, Remote Teaching, Web-Based Meeting, Distance Learning, Digital Technology, Pandemic, COVID-19. Search criteria identified relevant literature from the last two decades, including a rigorous study by specifying the keywords mentioned above within the time frame from 2000 to the present. Understanding methods, strategies and theories used in pre-COVID online design studio pedagogy is essential to compare against outcomes and techniques in a post-COVID world.

It is widely recognized that the use of digital technology in the discipline of architecture and design studio started in the mid-1990s ahead of every other design discipline.[13] [14] Today, it is increasingly rare that architecture school does not use some kind of digital tool either for design, drafting or fabrication. Several scholars examine the architecture design studio's theoretical and pedagogical frameworks and propose several integrated models as instructional methods for online education such as the Multimodal Model,[15] blended learning, hybrid method, virtual or middle ground. The widely used form of online education is blended learning, which combines personal interaction from live class sessions for greater learning flexibility.[16] The online part of blended subjects often incorporates an online platform such as a Learning Management System (LMS) as a resource center. Online lectures, discussion forums, file, and video sharing are often part of blended learning experiences and can be augmented by social media tools such as Facebook to incorporate professional feedback or facilitate collaboration among students.

Bender et al. (2006)[17] argues that blended learning will enhance studio courses by infusing traditional studio with online technologies (personal interaction from live class sessions with online education). Blended studio learning could provide a transitional middle ground to a fully online design course.[18] This could support enhanced student learning, provide targeted instruction to individual students, and serve a larger student body without increasing faculty workload.[19]

Shannon et al. (2013)[20] use case study methodology to report on the introduction of blended learning for architecture and architectural engineering students and finds that students who refrain from engaging in the blended online environment do not prosper academically. Conversely, there is no loss of academic conceptualization when face-to-face teaching is replaced by other forms of engagement.[21]

Craig S. Griffen (2016)[22] studied the feasibility of online education in four architecture programs and discussed how online teaching could increase and enrich the pedagogy and effectiveness of architectural education. The study identified opportunity, documentation, and democratic as benefits or shared advantages of fully online teaching as opposed to separation, methodology, and technology as challenges. The author suggested using online learning as one of many tools to enhance the existing, proven methods and exchange of knowledge, regardless of location.

Marta Masdéu (2017)[23] argues that the Design Studio is the core of education in architecture, which is conceived as a constructive learning space where students can build up their knowledge through an active process of interpretation, questioning, and experimentation. Reconceptualizing the pedagogical approaches (such as distance, blended and participatory learning) can change the learning process in the Design Studio that can also transform it into a new participatory and delocalized learning space. The Virtual Design Studio, as blended learning, also offers students the opportunity to collaborate with learners from other universities in a global context.[24] [25]

To support this concept, Katja Fleischmann[26] conducted a four-year study involving 119 first-year undergraduate design students who reported on the development, implementation, and iteration of a blended learning experience in an introductory design subject. Learning Management System was used as an online platform for video lectures, software tutorials, and face-to-face tutorials and readings. The blended model is considered an effective approach to enhance the student learning experience and better manage self-directed learning. The online components (lectures, software training, repository) requires less travel time and students have greater control over the pace, time, and place of their learning, which proved to be effective.[27]

Rodriguez et al. (2018)[28] reported a collaborative learning experience from two case studies and found that a hybrid approach by combining conventional studio, Virtual Design Studio (VDS) and live projects could be an effective way to maintain student engagement and motivation at different levels. This novel and effective collaborative learning method in architectural education could maintain student engagement and motivation at different levels by enhancing the sense of belonging, ownership, promoting self-motivated actions, and encouraging lifelong learning.[29]

Although the use of digital technology in architecture education is a common phenomenon, the majority of architecture schools prefer face-to-face design studio instruction. Research has found that design educators believe design studio teaching is inextricably linked to face-to-face teaching, and design education does not lend itself to be delivered entirely online.[30-31-32]

The design studio instruction could be enhanced by using digital tools, technology, and learning management systems (LMS) such as Blackboard, Moodle or Google Classroom. Several online communication tools could be used in addition to face-to-face instruction such as blogs and discussion boards; social media platforms like Facebook; and image sharing platforms such as Flickr, Instagram, and Pinterest.

4. CHALLENGES AND OPPORTUNITIES—AN HBCU CASE STUDY

From the literature review, it can be seen that there are many opportunities to be found in online components to design studio education. However, many institutions grappled with the sudden transition to online education during the pandemic. This paper focuses on the experiences of the faculty (including the authors) and students at Howard University during fully online delivery of design studios in Fall 2020 and Spring 2021. The authors received responses from 9 design studio faculty (full-time and part-time) teaching across all 5 years of the program with questions including pedagogical approaches, the technology used, challenges and opportunities they experienced, and issues of equity and the digital divide. The authors received responses from 36 students across all 5 years in the Department of Architecture who gave insight into their experiences during the transition to online design studio instruction. While some of the questions and responses could apply across all universities, the authors analyzed where there were challenges and opportunities unique to the HBCU experience and where answers could provide essential information for rethinking architecture pedagogy and HBCU design education to address issues of equity, diversity and the digital divide.

The survey results showed a range of pedagogical focus across the studios, including theoretical, discursive design, comprehensive, urbanism, community engagement, and hands-on learning. The institution never taught online studios, although one faculty has taught hybrid lecture classes before. Faculty and students strongly agreed that technology was fundamental to conducting the online studio. However, while 75 percent of the faculty agreed or strongly agreed that they had the technology they needed to conduct their studio, only 37.5 percent agreed or strongly agreed that the students had the technology necessary to engage in the online studio. This aligned with the students' perspective, with 14 percent stating that they did not have the technology required to participate in the online studio. While students may have had the technology to complete the studio, they may not have had the necessary software knowledge to participate in the online studio. 24 percent of students disagreed when asked if they had the required software knowledge, with 27 percent being neutral.

The most widely used technologies were Zoom, Blackboard (LMS), Mural, scanned hand sketches, and communication methods such as phone calls, email and chat platforms such as GroupMe. All faculty noted that the students responded best to Zoom, with students confirming this. Students also responded well to the integration of Blackboard (LMS), hand sketching and communicating via phone call and email. These results outline that students seemed to benefit most from live interactions instead of asynchronous instruction.

In addition to access to technology (hardware and software), the faculty's main challenges were internet connectivity, longer hours, student mental health, and student access to resources. Seven faculty also outlined student engagement and faculty mental health as significant issues (Figure 2). Numerous faculty also highlighted the financial and physical insecurities facing some students. COVID-19 has exacerbated the mental health issues affecting architecture students as they have dealt with isolation, financial and housing insecurities, and loss of life. While COVID-19 may not be here forever, it has forced many faculty to confront the mental health issues facing architecture students and the nature of studio culture and the profession.

These issues mirrored those expressed by students. Mental health concerns, lack of studio culture, engagement in the studio, internet connectivity, access to resources, and the general remote environment were cited as challenges experienced during the transition to online design studio instruction (Figure 3). This significantly affected student's motivation in the design studio, with 48 percent of students stating that they were not motivated and able to continue working on their design studio projects online, with 27 percent being neutral.

The main opportunity cited by faculty and students was the ability to engage and collaborate with guest critics and institutions nationally and internationally (Figure 4 and Figure 5). Flexibility, harnessing innovative technology, and innovation in delivering feedback were also cited as opportunities.

Faculty were also asked about the long-term pedagogical implications of online architecture programs, with several outlining the flexibility, global collaborations, and innovative technology and pedagogy that being online affords. For example, as one faculty member outlined, online programs and embracing the digital realm can offer " a means of critiquing architectural representation, critiquing the role of architects as creating purely physical environments and inviting more BIPOC (Black, Indigenous and People of Color) practitioners and educators into the classroom for lectures, crits and reviews." In addition, there is the opportunity to "broaden those who can participate with the class. Cost implications and potential savings may drive online education, which has major implications for international students and education." As Howard University serves many students of the African Diaspora, this notion of collapsing borders while opening collaborations across the Diaspora is a crucial consideration for the university's future design education. Throughout the survey, faculty appeared to embrace hybrid modes of studio education as an opportunity

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Figure 2. Challenges Faculty Experienced During the Transition to Online Education. Image Credit: the authors.
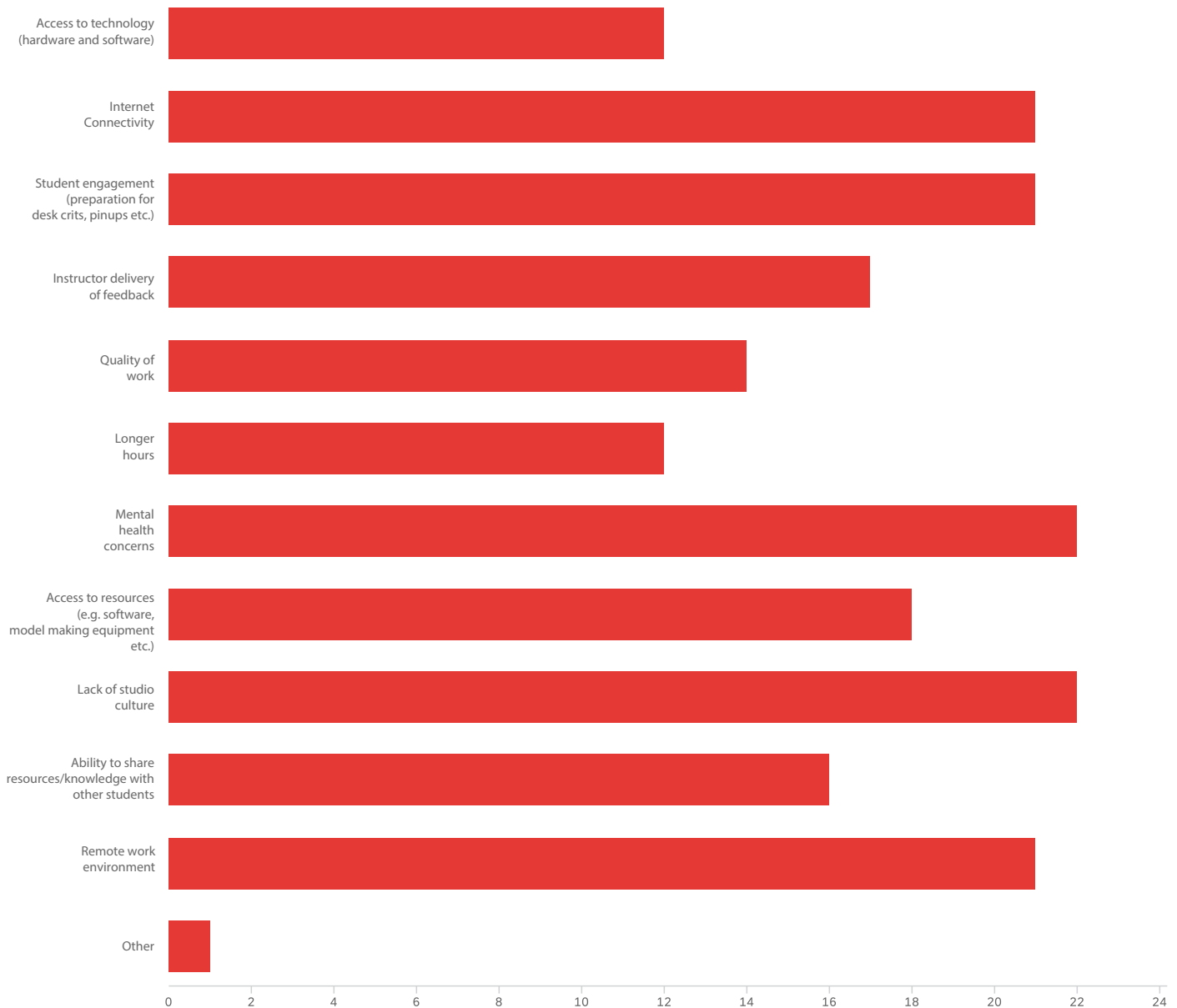
Figure 3. Challenges Students Experienced During the Transition to Online Education. Image Credit: the authors.

to harness the technologies while creating a useful supplement to traditional in-person education, as has been mentioned throughout the literature review. This hybrid nature could eliminate some of the negative aspects of online education cited by faculty, including social separation, students' mental health, and work-life balance.

Given the role Howard University plays in educating low-income populations and producing African American architects, faculty were also asked for their thoughts on online design education and equity issues in the profession. One faculty respondent believed that online architectural education could address issues of inequity in the profession, with

eight saying maybe. Some faculty outlined the potential for online education to overcome economic hardships that would make in-person instruction unachievable for some (provided stability at home and technological access are resolved) and the potential for entry into the profession for low-income students. There are parallels to be found in the "early twentieth-century correspondence course, which provided a path to upward mobility for many African Americans, women, and others denied a place in elite universities." [33] However, many expressed doubts if these gaps can be filled through online education alone. "The concentration of resources in an in-person environment likely outweighs the benefits of meeting students where they are. Additionally, many of our students
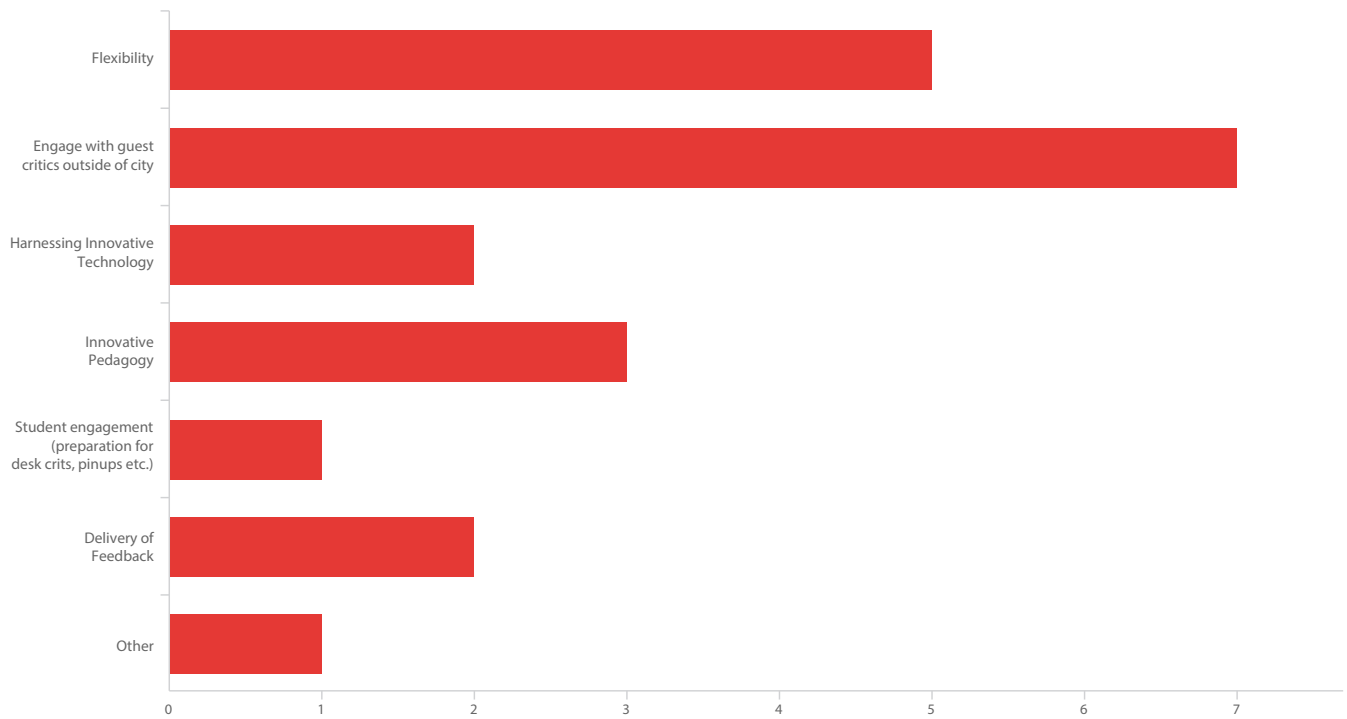
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Figure 4. Opportunities Faculty Experienced During the Transition to Online Education. Image credit: the authors.
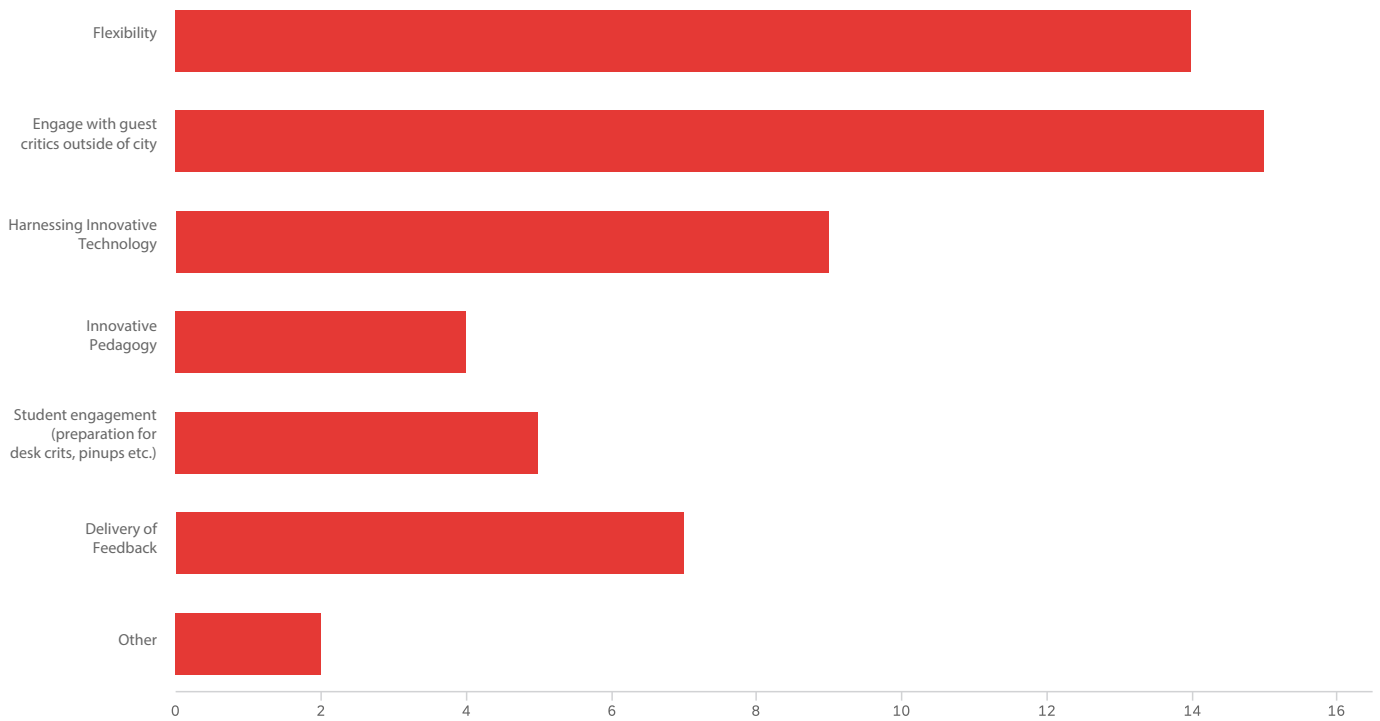

Figure 5. Opportunities Students Experienced During the Transition to Online Education. Image credit: the authors.

may be in a more stable environment on campus than back home or on their own." Another faculty member stated, "online instruction unintentionally identifies the inequity gaps between students, which is not a good thing. If there is a silver lining to be found, it could allow schools to better identify how to close the gaps with these students."

Students were also asked about their views on these issues, with 26 percent stating that they believe that online design education has the potential to address inequity in the design profession, 21 percent stating no and 21 percent stating maybe. Those who expressed pessimism cited access to technology as a crucial issue that would need to be overcome to address equity issues through this form of architectural education. One student acknowledged that "although the financial burdens of design studio are less because of the lack of required physical models, there is still a burden." Another stated, "if we're failing to address the inequity of architecture as a profession in person, adding layers of time zones, internet connectivity and camera access does not help."

These perspectives outline that while there could be an opportunity in online education to provide higher education opportunities, there is also the potential to increase the digital divide if resources and support are not provided. As one faculty stated, "while it is a given that students today are generally more technologically savvy because most were born into the techno-universe, some students simply still learn better hands-on. Gaps in equity are also directly related to this. So, while there may be a statistical uptick in digital proficiency, there will still be others that are negatively impacted."

Students echoed this sentiment, with 48 percent expressing that they thought that online teaching of architectural design studio could increase the digital divide, and 31 percent saying maybe. Some students expressed optimism in the new design skills and technologies that being online forced them to be exposed to. However, many students expressed that the lack of access to technology and resources, different learning styles and range of software skills had the potential to increase the digital divide.

5. CONCLUSION
From the survey, the main challenges at Howard University were access to technology and resources (students and faculty), internet connectivity, longer hours, student engagement, and student and faculty mental health. Despite the challenges outlined above, 55 percent of the faculty expressed that they were satisfied with their design studio in the online environment, while 44 percent were neutral. Similarly, 66 percent of the faculty said they were likely or very likely to voluntarily teach an online design studio in the future as they saw opportunities to rethink and enhance architectural design pedagogy at the institution. The results were more varied from the student perspective. Of the student responses, 45 percent

were neutral on their satisfaction with the architectural design studio in an online environment, 17 percent were satisfied and a total of 37 percent were dissatisfied. While 66 percent of faculty see opportunities and would voluntarily teach an online architecture design studio, only 10 percent of the students would likely take an online design studio in the future.

While these challenges and opportunities may be seen across other universities, it is important to evaluate them through the lens of the HBCU experience, thinking about the communities they serve, resources available, and their role in diversity in the profession. For example, the authors see some of these challenges being exacerbated by the percentage of low-income students being served and the absence of the support system being on campus at Howard University provides. Similarly, the authors see that the opportunities provided by online instruction have the potential to strengthen the collaborations, community engagement, and design justice pedagogies already a part of the architectural landscape at Howard University.

However, as noted in the student responses, many obstacles such as access to resources and technologies, maintaining student engagement, and addressing mental health concerns need to be overcome for online instruction benefits to be truly realized. Solutions include, blended or hybrid instruction, rethinking the curriculum to address software knowledge, integration of innovative technology in design pedagogy, on-site and remote access to technology, industry collaborations with shared resources, experiential learning (remote or on-site), national and international mentorships and engagement with national and international BIPOC designers. These are all potential ways to harness some of the opportunities inherent in online design studio education to benefit the students. These instructional ideas can significantly impact the rich architectural education at Howard University (and other HBCUs), as they begin to address the student needs while strengthening and promoting the pedagogical ideals surrounding design justice and community engagement to a broader audience while continuing to develop architects of color.

While this paper focuses on the experiences at Howard University, the authors are in the process of surveying faculty and students at other accredited HBCU architecture programs to see if experiences at other institutions align with those at Howard University. This evaluation could be used to harness and amplify HBCU architectural education in the future while embracing the potential for hybrid instruction in a post COVID-19 world.

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