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# THE EVOLUTION OF ARCHITECTURAL EDUCATION IN THE ERA OF SOCIAL REVOLUTION AND TECHNOLOGICAL ADVANCEMENT

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**Abstract**

This paper explores the systemic shortcomings (economic, gender and racial inequities, etc.), identified as *challenges* in the paper, that persist in education despite the transformative events that have altered the global context of 21st century education in recent years, viz. the *Me Too* and the *Black Lives Matter* movements. At the same time, the technological advancements in teaching, most dramatically because of the Covid-19 pandemic, have led to further development in educational modalities, such as online, hybrid and remote.

While the paper examines the issues that confront education in general, it focuses on the endemic problems that plague Architecture Design education, the structure of which, within the broader framework of educational models, is not only atypical and novel but, fundamentally, collaborative in nature and in great need of social justice reform. The paper is based on the observations, analysis, and conclusions of its two authors, whose combined experience of teaching Architecture spans almost seven decades.

The paper offers remedies, such as the need to incorporate new teaching and learning technologies in the classroom, as well as the inclusion, in Architecture Design curricula, of projects that promote social justice, to prepare socially responsible, technologically savvy architects for future professional practice.

To address the complex challenges that the prolonged Covid-19 pandemic has created for students and educators alike, the paper proposes the adoption of the *hybrid* format for teaching Architecture Design. Such a format leverages the strengths of traditional teaching methods with the benefits of technologically driven learning systems and platforms, such as virtual boards (termed the *Virtual Studio* --- a type of flipped classroom --- in the paper), to provide students and instructors with round-the-clock access and more effective communication, so vital to a successful and productive Architecture Design classroom environment.

*Keywords: Virtual Class Environment, Innovative Uses of Technology in Classroom, Collaborative Learning, Social Stratification and Social Mobility, Social Movements*

## Introduction

Architectural education has always been viewed as a means to provide the necessary skills to enter the profession. Originally being based upon the traditional master-apprentice paradigm, which typically spanned over many years, Architectural education, over time, has evolved into a 5-year Bachelor of Architecture degree, or more recently, a 6-year Master of Architecture degree. The aim has remained, however, the same: to produce trained labor for Architecture firms.

However, during the last few years, as the context of Architecture has undergone transformative changes, so both Architecture practice and Architectural education need to change dramatically in response. The Covid-19 pandemic, as well as the *Me Too* and the *Black Lives Matter* movements, have been the key markers for social justice, among other events, that have impacted society at a global scale. These developments have, inevitably, also transformed the world of Architecture on multiple levels (economic, social, racial and political, to name just a few). What is required from education in general today, including Architectural education, is a response which, at a minimum, recognizes these events as its new context.

While Architectural education has always been a complex process, it is now even more so as it confronts a new set of challenges. By their very nature, both the study and the practice of Architecture call for a marvelous synthesis of creative flair and rigorous analysis, a quality possessed by a relatively small number of students. Creative individuals lacking analytical rigor, or vice versa, are, therefore, not ideally suited to the study and practice of Architecture. As a result of the inherently complex nature of Architecture, its study requires the integration of the knowledge of a broad range of disciplines that fall within the purview of Architecture. The recognition of this fact can be found as early as the first century BCE, in the seminal work of the Roman architect, Vitruvius, who wrote, in The Ten Books on Architecture, the earliest surviving architectural treatise in the western world:

*"The architect should be equipped with knowledge of many branches of study and varied kinds of learning… This knowledge is the child of practice and theory …this study is so vast in extent… "*[1]

A contemporary architect who fully appreciates the complex interaction between human beings and the architectural environment is the Finnish architect, Juhani Pallasmaa, who has stated:

*"Our bodies and movements are in constant interaction with the environment; the world and the self inform and redefine each other constantly. "*[2]

This paper explores the shortcomings that persist in Architectural education. While these issues have been problematic all along, they have become glaringly so within the new global context of 21st century Architecture; these shortcomings, therefore, cannot be allowed to fester any longer. The paper identifies these issues as *challenges* and aims to offer remedies, to prepare Architecture students in a robust manner for their future careers in the new century.

[1]*Morris Hicky Morgan, Vitruvius: The Ten Books On Architecture. (New York: Dover Publications, Inc., 1960), 5-10.*

[2]*Pallasmaa, Juhani: The Eyes of the Skin: Architecture and the Senses (West Sussex: John Wiley and Sons, 2012), 40-41.*

## Challenge 1: The Uneasy Marriage between the Academy and the Profession; Architecture School Imitating Architecture Practice

Since the principal objective of Architectural education has traditionally been to train students for Architecture practice, the model for the Architecture Design Studio class continues to be the Architecture office. In this regard, a distinction needs to be made, however, between the context and the content of the profession.

The context of Architecture practice, regarding professional behaviour, has remained much the same over the decades. Therefore, an emphasis on punctuality, time management, deadlines and high productivity would be appropriate to inculcate in the Architecture Design classroom.

On the other hand, the content of the work that Architecture practices are now undertaking, and how they are doing it, has evolved over time. Architecture programs need to adapt their curricula not only to reflect the changes that the profession has already implemented, but in fact, they should pre-empt those that the profession will need to incorporate in the future. In other words, instead of mimicking the Architecture office, the Architecture Design class should be conceived as a laboratory for the experimentation not only of Architecture design ideas but also of principles governing Architecture practice.

Over the years, much criticism has been levelled at Architecture schools by practicing architects, often pointing out that the schools are not training their students adequately for practice. There are two key issues to consider in this regard:

- Most of the faculty members teaching Architecture Design are trained architects, with academics making up a small minority; in fact, Architecture programs are eager to appoint registered architects, often with thriving practices, to teach Architecture Design classes.
- Internships for Architecture students are, almost always, within Architecture offices.

Even though the academic learning that takes place in the Design class is modelled after Architecture practice, the learning in the classroom and the professional experience that is gained through internships are quite distinct learning experiences, complementing each other within the totality of an Architectural education. Shortcomings in one sphere often accompany shortcomings in the other; hence, both spheres should be critiqued. In fact, a legitimate question, from an educator's perspective, is: Do the shortcomings of Architectural education not actually originate in Architecture practice, since that forms the model for Architectural education in the first place?

In both Architecture practice and in the Architecture Design class, research, analysis, and programming are conducted as the basis for design. Since Architecture practice is motivated by efficiency and profitability, parameters must be clearly established early on, and objectives are clearly defined by schedules and budgets. By contrast, the Design class, where profitability is not a concern, can often lack a sharp focus on cohesive objectives and quantifiable metrics.

Another disconnect between the Design class environment and Architecture practice is that while the boss in an Architecture office has a single, clearly defined role, the Critic in the Design class has an ambiguous role to play; while being, first and foremost, the teacher, from time to time the Design Critic does also play the roles of the Boss, the Client, or the Consultant. This ambiguity can, sometimes, confuse the students.

## Challenge 2: The Disparate Threads of Knowledge and Skills

Another important challenge for Architectural education is that, as Vitruvius has stated, the student of Architecture has "… to be both naturally gifted and amenable to instruction", a combination of qualities that is not as common as it may seem. Moreover, the ability to integrate the knowledge of diverse branches of learning, that are necessary for an Architectural education, calls for a level of comprehension and maturity that is often wanting in students. In this regard, Juhani Pallasma's all-encompassing approach to Architectural education is clear:

*"I would advise students to look at everything, including technology, with sensual and poetic eyes. The true task of architecture is to ennoble our daily life. "*[3]

[3]https://www.archdaily.com/776761/juhani-pallasmaa-on-writing-teaching-and-becoming-a-phenomenologist

## Challenge 3: The Unprepared Student

While every young person has encountered a doctor and is familiar with what a doctor does, and most young people, after watching countless courtroom dramas, have a fairly good idea of what a lawyer does, very few young individuals who apply to Architecture school, on the other hand, have either ever met an architect or have much of an idea of what an architect does. In most cases, the knowledge about Architecture, unlike that of medicine or the law, is revealed to students only after they are already enrolled in an Architecture program.

Also, while first year college students are already well acquainted with the techniques of learning the humanities and the sciences, such as taking and reviewing notes, and learning and practicing formulas, the methods needed to learn Architecture (viz. sketching, drawing, model-making, etc.) are radically different, and most students who enroll in an Architecture program have never experienced them before. Consequently, Architecture students must first learn the methods they need to use to learn Architecture; in other words, Architecture students must *learn to learn* Architecture.

## Challenge 4: The Untrained Teacher

Good architects do not, necessarily, prove to be good teachers of Architecture, especially of Architecture Design. The teaching of Architecture Design requires not only a fundamental knowledge of design principles and processes, but also a special temperament: a magical concoction of intuition, passion, and empathy, together with a finely calibrated sense of when to allow the student unfettered creative freedom and when to demand uncompromising analytical rigor. Moreover, to run a Design class effectively, the Design Critic needs to monitor not only the progress of each student individually, but to simultaneously keep track of the collective pulse of the class as a whole. The sensitivity needed to teach Architecture Design effectively is even more necessary for teaching in the early years of an Architecture program when the students are not only young, but they also lack the basic knowledge and skills of Architecture.

Since most teachers of Architecture are architects, without any formal training as teachers, they, too, must learn to teach. Many stumble into teaching, only to find that it was their true calling all along, often finding it so fulfilling, perhaps even addictive, that they could never contemplate doing anything else! Although lacking formal training in education, with experience, good teachers of Architecture do learn to clearly define the learning objectives for their courses, together with project deliverables and competencies related to individual assignments.

The symbiotic relationship between teaching and learning relies heavily on effective communication that facilitates the transfer and assimilation of essential knowledge for successful outcomes. The Architecture Design class has always been a unique space for the transfer of knowledge and skills, through a collaborative, communicative process, which results, quite magically, in the transformation of cerebral ideas into physical form.

Since the very beginning, technology has been an integral component of Architecture. In fact, the very word, "technology", is a composite word consisting of the Greek words *techne* (meaning "to build") and *logos* (meaning "knowledge"). The word, "architect", is similarly derived from the Greek word, *architekton*, which means "master builder". The knowledge of building, viz. technology, is, therefore, essential to the work of the architect. Technology has always played a crucial role in the building industry, particularly since the Industrial Revolution, as highlighted by the development of modern construction materials (viz. steel, glass, and concrete) as well as modern machines, such as elevators and escalators.

For the past few decades, developments in digital technology have also become vital to Architecture, not only in terms of their impact on the construction industry (such as for the construction of complex architectural forms) but also for architectural representation (for 2-D drawings and renderings, as well as for 3-D printing and virtual environments). In recent years, the ever-increasing infusion of technology, in the methods of Architecture instruction and project delivery, has added yet another layer of complexity to the teaching process. A sound knowledge of digital software, together with a basic competence in computer hardware, is rapidly becoming essential to teaching effectively in today's Architecture Design classroom.

[3] *Morris Hicky Morgan, Vitruvius: The Ten Books On Architecture. (New York: Dover Publications, Inc., 1960), 5.*

[4] *https://www.archdaily.com/776761/juhani-pallasmaa-on-writing-teaching-and-becoming-a-phenomenologist*

## Challenge 5: For Whom Are We Designing?

The Architecture profession has historically served the elite in society; design projects in the Architecture Design class have, therefore, traditionally reflected the same bias.

Such a practice cannot continue any longer; design projects given in the Architecture Design class will have to address the burning issues of the new century. Concerns, such as social justice and economic equity, as well as gender and racial equality, are taking centre stage throughout the world. If architects are to play a meaningful role in society, they, too, need to develop a genuine understanding of these issues as they prepare, as students in Architecture school, for their careers. To this end, new types of projects, incorporating a paradigm shift in the understanding of the nature of design, will have to be explored in the Design class. In this regard, projects such as housing for single parents with children, multi-generational families, or low-income families with live-in paying guests would be appropriate for the 21st century Architecture Design class; these are good examples because they respond to the needs of evolving definitions of the family in the new century. Other relevant design topics would be day-care centres for the child-care needs of working parents, housing facilities addressing the widespread problem of homelessness, as well as sustainable design solutions to combat climate change. Architecture students should be exposed to the complexity of the world that they are being educated to serve.

## Challenge 6: Studio Culture

A systemic problem, which has pervaded both Architectural education and the Architecture profession, is the existence of a deeply entrenched patriarchal culture; within this culture, the "star-chitect", inevitably a male architect, is revered as the role model. Not surprisingly, therefore, the heroes of the profession have, historically, all been male architects, and this phenomenon has persisted, with very few exceptions, into the 21st century. The flip side of the same phenomenon has resulted in the segregation of women, in the Architecture profession, into a separate sub-group of professionals, who are treated as second class citizens rather than being valued as equal collaborators and contributing members within the profession, with countless instances of significant contributions of women architects being minimized or altogether ignored.

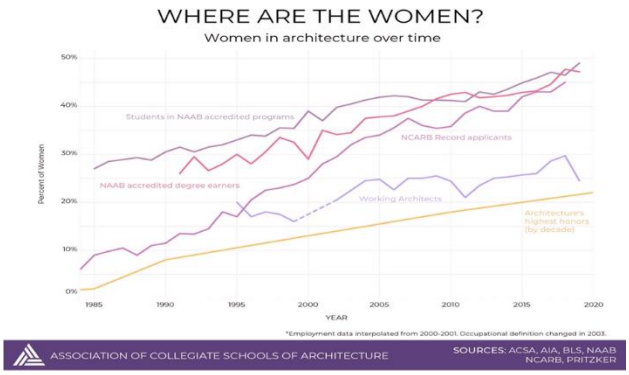


**Fig. 1. Number of Women in Practice and Architectural Study.**

Since the culture of the Design class in Architecture school is modelled after the male-dominated Architecture practice, and since practicing women are significantly under-represented in the profession, from which pool most Architecture schools appoint their Design faculty, most instructors in Design classes, quite inevitably, end up being men. As a result, female students enrolled in Architecture programs have very few professional role models to emulate; while this issue is common to many professions, it is particularly endemic to Architecture.

Another challenge to Architectural education is that the pedagogy in the Design class tends to promote aggressive competition between students, aiming to produce "star" students, who emulate "star-chitects" as their role models: this strategy is antithetical to a collaborative approach to design. Buildings, the products of the architectural process, have always been the result of collaboration between the vision and finance of the client, the creativity of the architect and the labour of the builder; in the 21st century, as Architecture becomes ever more specialized, collaboration between specialized professionals becomes even more vital to the success of the profession.

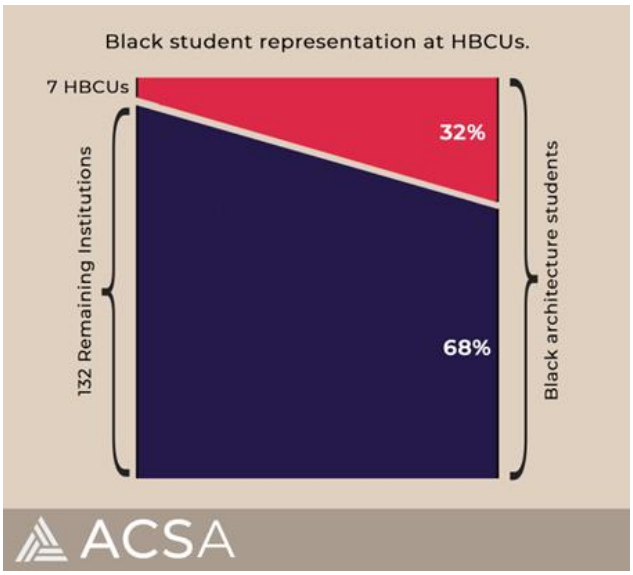


**Fig. 2. African American Students in Architecture Schools**

This does not mean, however, that all projects given in the Design class should be team projects, but rather that students should be engaged in a classroom environment that promotes creative dialogue and an exchange of ideas among students, as well as between students and the Design Critic. Such an approach would also help to alleviate the excessively stressful environment that students encounter at Architecture school. Also, such a shift in Studio culture would better simulate the real-world experience of professional practice, where architects work as part of a larger team of designers and consultants.

Together with women, other marginalized groups in society, such as people of colour and members of minority communities, have also been grossly under-represented, both in the Architecture profession as well as in Architectural education. A possible strategy to include under-represented voices is to consciously reach out to include, in the architectural umbrella, those who represent their communities, even if they may lack formal Architectural education, such as individuals who have made architectural contributions to their communities as builders or sweat-equity labourers.

Such an approach would be especially beneficial to low-income communities whose members could be facilitated and empowered by the architectural community, both Architecture schools and the Architecture profession, especially through the transfer of knowledge related to sustainable materials and technology.

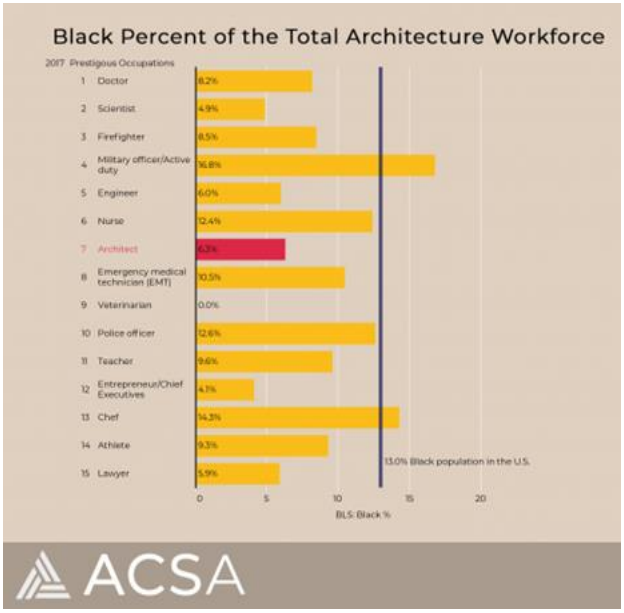


**Fig. 3. Number of Blacks in the Architecture work Force.**

## Challenge 7: Professional Careers

Traditional Architectural education has, fundamentally, been based upon the assumption that every graduate from an Architecture program will, eventually, become a designer, either in their own architectural practice or as an employee in another architect's office. Career possibilities within the Architecture profession have, however, always been much more varied, and this diversity, within an ever-expanding umbrella of the profession, is even greater today. Developments in digital and other technologies are giving Architecture graduates an even greater choice to define their career paths, as project architects, 3-D visualizers, administrative executives or educators. This 21st century context of Architecture requires a thoughtful reformulation of the Architecture curriculum, designed in such a way as to provide a robust education for a variety of professional paths within the Architecture profession.

## Challenge 8: Technology

### A Challenge, Solution or Both?

The challenges highlighted above are broad in scope, and they can only be addressed with a structural, or systemic, reformulation if sustainable results are to be achieved. The convergence of two key markers, the Covid-19 pandemic and digital technology, has ushered in a potential paradigm shift in what form the Architecture Design classroom may take in the 21st century.

Architecture Design education has, traditionally, taken a tactile, artefact-driven pedagogical approach. Incremental changes in project delivery over the years, together with the seismic impact of the Covid-19 pandemic, have, however, forced heavy reliance on digital technology as the primary pedagogical tool.

As the disruptions precipitated by the pandemic have rippled through virtually all spheres of human activity, the academic world has not been spared. Schools of Architecture throughout the world, too, have faced an existential dilemma: to shut down for a prolonged period of time, or to find a new way of engaging in Design teaching, while still ensuring the safety of students and faculty.

The process of design has several stakeholders, so collaboration is an inherent characteristic of the design process. The Architecture Design class is, therefore, as stated earlier, a collaborative environment by its very nature, and collaboration is nurtured throughout an Architecture program's pedagogy. Moreover, the tactile nature of creating architectural artefacts, such as models and other deliverables, coupled with the need to often work in teams, necessitates uninterrupted communications for successful outcomes.

Physical distancing, a public health necessity during the Covid-19 pandemic, has greatly restricted and, in some cases, completely eliminated the possibility of the physical use of the Design classroom space by both the students and the instructor. The use of technology (hardware and software) has, therefore, become the inevitable bridge to enable the necessary collaborative and creative Design activities to continue, albeit in a virtual space.

## The Virtual Studio

There has always been a general consensus among Architecture educators that the Architecture Design classroom is truly a unique environment that facilitates creative learning by providing students 24-hour access to simultaneously engage in introspection as well as collaboration. The Design classroom, usually having an open plan layout, has always been a multi-purpose space, designed to be a personal workspace where each student can receive an individual "desk critique", while simultaneously being a presentation space for design reviews and discussions, facilitating collaboration as well as healthy competition among students. This has meant that the actual spatial qualities of the Architecture studio are designed to encourage the process of creating, with desk space, pin up space and storage space all being essential to physically making the studio a viable space-place for teaching, learning and producing Architecture. In addition, the Design classroom is often a place for reflection and repose. Moreover, Architecture educators have generally agreed that such a special space, of teaching and learning, could not be replicated within a virtual environment.

The Covid-19 pandemic has, however, forced many long-held assumptions, including those about education, to be challenged, re-evaluated and, in many cases, discarded. The pandemic has, in fact, proved the veracity of the age-old maxim: "Necessity is the mother of invention". With the use of the physical space of the Design classroom being ruled out during the pandemic, Architecture Design instructors have turned to virtual boards (such as Miro, Mural, Collaboard, Lucidspark and Klaxoon among others) to serve as the "Virtual Studio", expanding the Design class space beyond the physical confines of the classroom. The effectiveness of the virtual board has even led to prominent online platforms, like Zoom, incorporating white boards directly into their programs.

The Virtual Studio provides all stakeholders round-the-clock access to their Design work. Collaboration is enhanced by multiple streams of

documentable communication, and the instructor enjoys a 360-degree view of the Design class at all times in real time. At the instructor's discretion, students may also have the same access, thereby maximizing collaborative opportunities. Moreover, the physical limitations of classroom pin-up space are no longer an issue since the virtual board is, quite literally, limitless.

Inevitably, as is often the case with pioneering ideas, initial limitations will emerge. For instance, in the Virtual Studio, the tactile component of the design process, explored through model-making, and always considered to be so essential to Architecture Design education, has had to be substituted by virtual modelling. It may, however, be argued that, while lacking the 3-dimensional presence of a physical model, virtual modelling is, actually, advantageous in better simulating the architectural experience at the human scale, by enabling "walk-throughs" within a building that a physical model does not provide. The virtual model can, therefore, impart a more experiential understanding of the design, as one is immersed virtually into the essence of a space through the digital exploration of volume, scale, light, material, colour and texture.

One might argue, though, that the lack of adequate access to technology itself can become a major impediment to virtual education, especially in underserved communities; however, on the other hand, it is also a fact that online learning and working have become the rule, not the exception, for a significant population of the world. Studies have, in fact, shown that students' access to educational technology is significantly higher than one may have expected at the onset of the pandemic and that the capacity for educators to effectively use technology as part of the teaching and learning process is steadily increasing. At the college level, a personal computer has been a necessity for many disciplines for several years; that the same trend should take place in Architectural education is hardly surprising.

The capacity of digital platforms and programs, linking students and faculty, to create learning communities, unfettered by the limitations of space or place, has had the added benefit of creating a more inclusive educational model. This model gives access to more resources, human and otherwise, because occupying the same physical space in real time is no longer necessary to communicate, collaborate and educate.

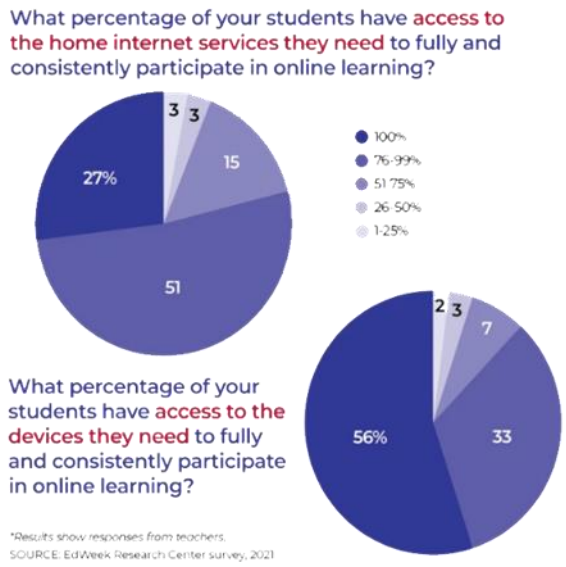


**Fig. 4. Student access to Technology and internet Services**.

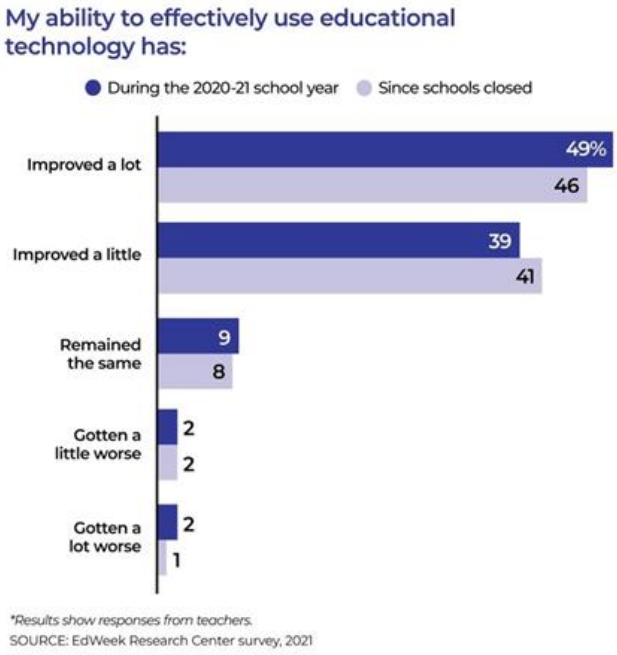


**Fig. 5. Educators use of educational technology**.

**Table 1.**
**Comparative analysis Virtual and Physical Studios**

| PROS & CONS | PHYSICAL STUDIO | VIRTUAL STUDIO (synchronous) | HYBRID STUDIO (synchronous) |
|---|---|---|---|
| **COMPUTER HARDWARE** | Limited Lab access<br>Personal computer advised<br>Teaching Digital station optional | Lab access optional<br>Personal computer required<br>Teaching Digital station optional | Limited Lab access hybrid<br>Personal computer required<br>Teaching Digital Cart needed |
| **COMPUTER SOFTWARE** | SketchUp, InDesign, Photoshop, Enscape , Lumion, AutoCAD<br><br>Syncplicity, Canvas<br><br>VDI Access (out of studio)<br><br>More physical artifacts likely in the physical studio | SketchUp, InDesign, Photoshop, Enscape , Lumion, AutoCAD<br><br>Miro, Syncplicity, Canvas<br><br>VDI – Access 24/7*<br><br>The Virtual studio can substitute the physical Models with experiential Virtual spaces. | SketchUp, InDesign, Photoshop, Enscape , Lumion, AutoCAD<br><br>Miro, Syncplicity, Canvas<br><br>VDI – Access 24/7*<br><br>More diverse artifacts (physical and digital likely in the hybrid studio) |
| **FUNDAMENTALS**<br>CRITICAL THINKING | Taught and Applied | Taught and Applied | Taught and Applied |
| TACTILE skills | Craft -Drawings/Models | Only Digital Substitute | Both Physical & Digital used |
| TECHNICAL skills | Taught and Applied | Taught and Applied (digital) | Taught and Applied |
| DIGITAL Skills | Taught and Applied -digital | Taught and Applied- digital | Taught and Applied - digital |
| **COLLABORATION** | Human Touch advantage<br>1 on 1 interactions | Numerous Options<br>Polls, Chat, breakouts<br>24/7 Access<br>More Access to Jurors | Human Touch advantage<br>Numerous Options<br>Polls, Chat, breakouts<br>24/7 Access , 1 on 1 options<br>More Access to Jurors |
| **COMMUNITY** | Human Touch advantage | Flexibility advantage<br>360 degree access<br>Macro and Micro Access | Human Touch advantage<br>Flexibility advantage<br>360 degree access<br>Macro and Micro Access |
| **ACCESS** | Limited Access to Studio content / Environment | 24/7 Access to Studio content / Environment | 24/7 Access to all Studio content and Environments |
| **EQUITY** | Subjective | Subjective | Subjective |
| **LEARNING ENVIRONMENT** | Class management and control potentially easier | Multiple options available<br>Less Instructor Control *<br>*no direct physical contact | Class management and control potentially easier<br>Multiple options available |

Empirical information gathered by observation of Face-to-face studio instruction from 2010 and online instruction from 2020 -2021 academic years PVAMU

## Conclusion: Professional Careers

With the prolonged continuance of the Covid-19 pandemic, it has become abundantly clear that we have ushered in a "new normal", with technology at the very heart of the Architecture Design classroom experience within the broader framework of an Architectural education. Over time, Architecture educators will be able to evaluate the benefits and shortcomings of the digital tools that have supplemented, or replaced, the more traditional modes of teaching and learning in the Design class.

After examining the strengths and drawbacks of the virtual and physical Design classroom experiences (as outlined by the authors in the table above), it can be concluded that the *hybrid* format would, likely, best harness the strengths of both modes of instruction. This format, with a varied combination of digital and traditional tools of instruction, depending on the specific context (available access to digital technology and the nature of the design project) would, likely, better serve all the stakeholders, viz. the students, the instructors, as well as the profession and the industry.

The inherent complexity of the Architecture design process, together with the perceived opacity of the Architecture profession by many students, results in the need to cover a broad range of Architecture topics in the Design class. The use of a comprehensive design project, as a means of stitching together the various learning objectives (competencies) into a coherent whole, has proved to be an effective teaching strategy. In this regard, the use of technology in the *hybrid* instruction model allows for an easier aggregation and comprehensive delivery of the project objectives and solutions.

Now that students and faculty alike have become accustomed to the tremendous benefits of the *hybrid* format for Architecture Design education, there is little reason to return to traditional teaching methods even when, at long last, the Covid-19 pandemic is over. The *hybrid* format is, therefore, the likely pedagogical method to be used in the Architecture Design classroom in the 21st century.

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