

The Profession and the Discipline: Some Thoughts on Healthcare Design Teaching in the USA

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ABSTRACT: As healthcare design is gradually becoming a specialized area within architecture, many schools in the USA are proposing and implementing different curricular models. A comparison of these indicates non-agreement in the essential needs of these graduates. Additionally, the two professional credentialing agencies for healthcare designers also have dissimilar criteria. The questions thus are: what knowledge and skills do graduates interested in healthcare design need, what does the profession expect, and how can the academia be appropriate?

This paper collects data from public domains of each organization. It analyzes the criteria of the credentialing agencies through content analysis of their examinations and compares the curriculum of six healthcare certificates in leading US schools. Additionally, it presents the results of an online survey of eighty-six healthcare design professionals that was conducted to understand the profession's view of what skills and knowledge healthcare architects need. From these, the paper identifies common areas and maps out discrepancies. Of special interest, this paper discusses the duality between the inclusive characteristic of design and the exclusive nature of research, and how they can be understood and addressed in healthcare design teaching. It breaks down the various aspects of design and research and maps them to find actionable intersections for the benefit of educating healthcare designers.

KEYWORDS: Healthcare Design Education, Credentialing in Healthcare Architecture, Evidence-Based Design (EBD), Architectural Curriculum Development, Design–Research Integration

INTRODUCTION

Healthcare and healthcare design in the United States has changed drastically in the last two decades. Arguably, the genesis for this altered attitude is the publication of the Institute of Medicine titled “To Err is Human: Building a Safer Health System” (2000). Its stark portrayal of the immensity of hospital related errors and preventable deaths, never previously reported, resulted in a national agenda for improving all aspects of healthcare delivery. Various organizations and think tanks contributed to this agenda, identifying practice, finance, and building models that could contribute to better healthcare. For example, the Centers for Medicare and Medicaid Services (CMS) adopted a value-based program that linked Medicare payments to reduction of Hospital-Acquired Conditions (HAC) in the inpatient setting. (Centers for Medicaid and Medicare Services, Hospital-Acquired Condition Reduction Program)

A subsequent publication of the Institute of Medicine brought out the importance of the physical environment, and hence that of architects. (Institute of Medicine 2004). This report suggested that the physical design of healthcare facilities greatly influences nurse efficiency and this in turn increases patient safety. For example, poor layout of patient care units and patient rooms can decrease the time nurses have to access and provide direct care of patients. On other factors too, the role of design gradually became more and more pronounced such that calls to consider architects as public-health professionals have emerged (Fisher 2019).

Added to these is the fact that the healthcare industry has also grown tremendously in the last decade. U.S. health care spending grew 4.1 percent in 2022, reaching \$4.5 trillion or \$13,493 per person. As a share of the nation's Gross Domestic Product, health spending accounted for 17.3 percent (Centers for Medicare and Medicaid Services 2022). Much of this spending is on capital investments. In 2023 US spent 63.35 billion in healthcare construction, one of the highest building categories. Thus, the scope and opportunities of healthcare architects keep on increasing.

While healthcare architects have access to a large and increasing market, they are also being called on to be more responsible about their proposals. One outcome from such conditions is the increase of evidence-based design. This is the process where design decisions are made with an informed client and are based on the best available information from credible research and evaluations of projects. Critical thinking is required to draw rational inferences about design from information that seldom fits a unique situation precisely. (Hamilton 2004). This process is based on knowledge, but its application is constantly being defined and made specific, based on the needs of each project. Evidence-based design is forward looking and creative, and more importantly, provides a basis for architects and management to have confidence in their design proposals. For this reason, research has become an important tool for healthcare architects. The question that arises is this: how should the academia respond to this greatly changed reality? How should architectural education evolve?

Before discussing education, the existing credentialing processes for healthcare architects in the US need to be understood and is described next.

1.0 CREDENTIALLING PROCESSES OF HEALTHCARE ARCHITECTS

For architects in the healthcare industry there are two credentialing paths. One is provided by the American College of Healthcare Architects (2023) and the other is Evidence Based Design Accreditation and Certification (EDAC), offered by the Center for Health Design. Before a discussion of these two, their nature and contents are described.

2.0 ACHA

The American College of Healthcare Architects (ACHA) provides board certification to registered architects who specialize in health care within the United States and in countries where NCARB reciprocal licensure can be obtained. Registered architects having licensure for three years and more than 6000 hours of healthcare experience in the last five years are eligible to sit for the examination. The process is overseen by an independent testing agency, in order to establish a professionally sound and legally defensible standard by which people can identify themselves as healthcare architects. The examination content is developed from a national survey of healthcare architects, and so exams vary within a fixed content outline. It consists of 120 multiple choice questions where 100 are scored and 20 are non-scored pretest questions. There are four 'domains' for testing and they are: (1) forces that drive the business of healthcare, (2) pre-design, (3) design, and (4) delivery and implementation. The weightage of the four domains is not the same and is shown in table 1 below. The time allocated for the examination is two and half hours. (American College of Architects 2023)

Table 1: Test domains and grade distribution for ACHA credentials. Source: (ACHA 2023).

Domains	Number of questions
Forces that Drive the Business of Healthcare <ul style="list-style-type: none"> • Economics and Reimbursement • Regulations and Accreditation • Healthcare Delivery Models • Technology • Staffing type and availability • Process Improvement/Lean Operations 	15
Programming and Planning <ul style="list-style-type: none"> • Strategic Planning • Functional/Operational Narratives • Space Programming • Site and Facilities Master Planning 	35
Design <ul style="list-style-type: none"> • Site and Facilities Design • Departmental Design • Detailed Design • Coordination with Engineering Systems. 	35
Delivery and Implementation <ul style="list-style-type: none"> • Contracts • Construction Documents • Construction Administration • Project Implementation and Occupancy Scheduling • POE evaluation and Research Findings 	15

It is quite clear that ACHA puts a high emphasis on Pre-Design and Design, as 70 percent of the questions are in these areas. Of additional importance, knowledge of research, or ability to conduct research is not tested.

3.0 EDAC

The second credentialing program called Evidence-Based Design Accreditation and Certification (EDAC), is for individuals who intend to demonstrate the ability to apply an evidence-based process to health facility design, including measuring and reporting results. The audience is more inclusive than ACHA's as it is aimed at a much larger group than only practicing architects. It includes architects, designers, healthcare executives, healthcare providers, academics, students, engineers, and product managers. This exam is administered by the Center for Health Design, an independent 501(c)(3) organization. The duration is two hours and has 110 multiple choice questions, of which 10 are not scored. (Center for Health Design 2023). The domains and weightage are shown in table 2 below.

Table 2: Test domains and grade distribution for EDAC credentials. *Source:* (EDAC 2023).

Domains	Percentage of the Exam
Evidence Based Design	25%
Research	25%
Project Set up and Pre-Design	15%
Design	15%
Construction and Occupancy	10%
Post Occupancy / Evaluation	10%

A quick comparison between the criteria of the two credentialing agencies reveals that 70% of ACHA’s focus is on programming and design. On the other hand, 50% of the questions for EDAC are in research, and applications of research in the design process. It becomes 60% if Post Occupancy Evaluation is included.

Interestingly, this comparison brings out two important, and perhaps higher order aspects. Healthcare buildings are extremely complicated and therefore need experience and special ‘expertise’. This seems to be the focus of ACHA. On the other hand, the notion of evidence-based design, which implies that each problem be tackled with up-to-date research knowledge and the ability to translate that knowledge to creative design, is the focus on EDAC.

4.0 VIEW FROM THE PROFESSION.

To get a better understanding of this ‘expertise’ and ‘evidence’ that is supposedly needed in healthcare design, as the two credentialing tests propose, a survey was carried out by the author. A questionnaire was created in Microsoft Forms and sent out digitally to practicing healthcare architects. The questions were set up in the context of what they expected from a newly hired architectural intern in their healthcare design practice. There were 26 questions, set in a 5-point Likert scale, and broadly categorized in four groups. These were: (1) basic understanding of healthcare facilities (figure 1), (2) professional preparation (figure 2), (3) disciplinary and interdisciplinary issues (figure 3), and (4) research (figure 4). Eighty-six respondents returned the survey; among whom 60% were healthcare architects and 26% were principals or partners in healthcare facility design firms. Responses to the questions divided in each category are shown in the figures below.

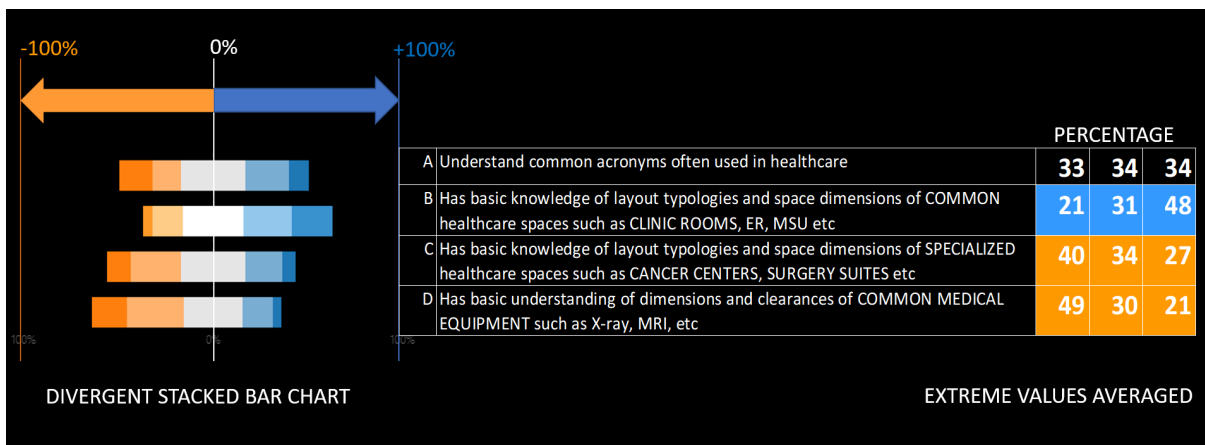


Figure 1: Questionnaire results of Category 1: ‘Basic Understanding of Healthcare Facilities’. Divergent stacked bar on the left, actual questions in the middle, and percentages with extreme values added together on the right. *Source:* (Haq 2024).

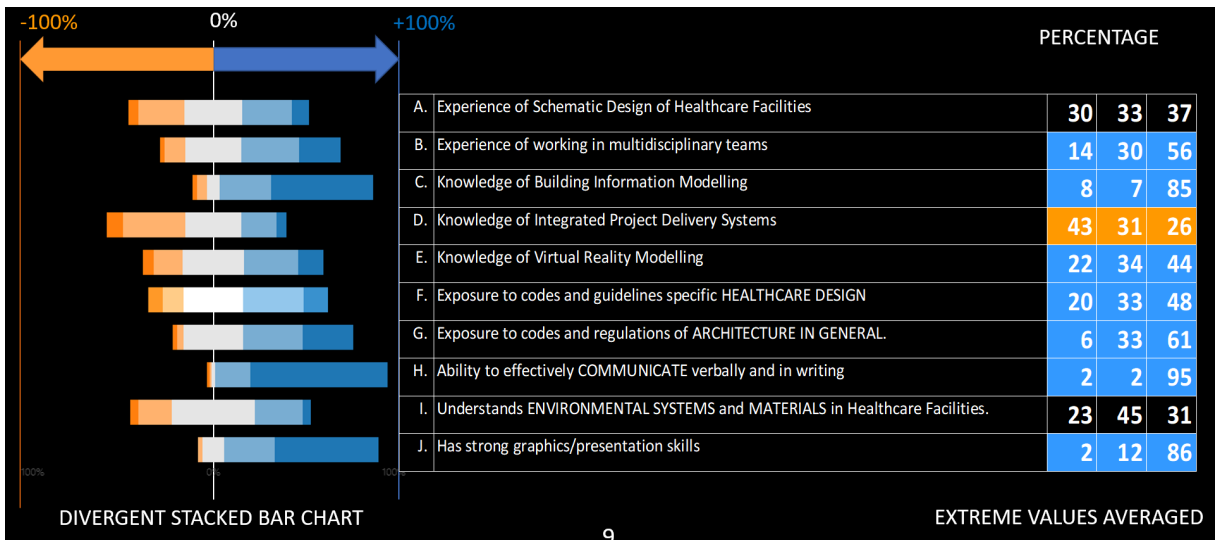


Figure 2: Questionnaire results of Category 2 'Professional Preparation'. Divergent stacked bar on the left, actual questions in the middle, and percentages with extreme values added together on the right. Source: (Haq 2024).

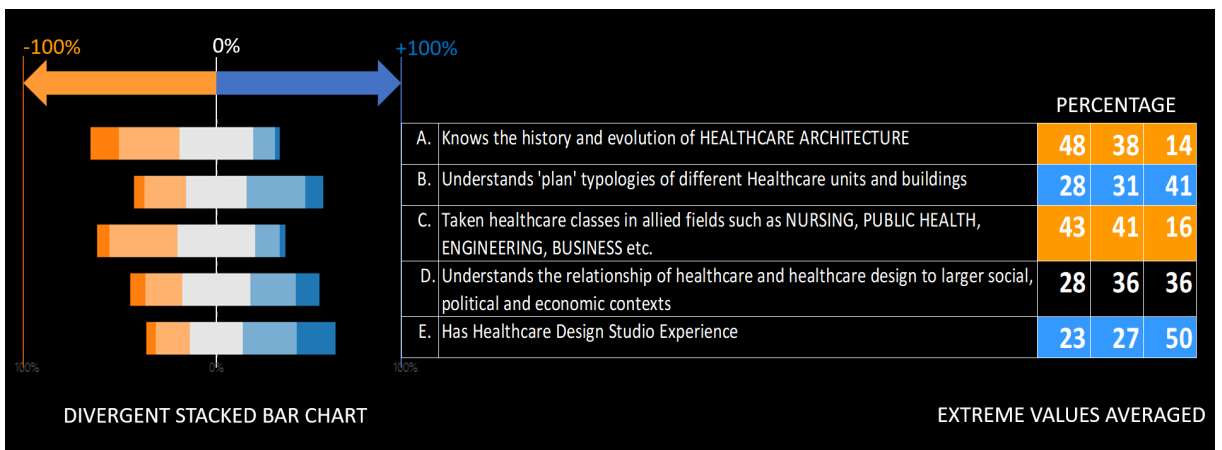


Figure 3: Questionnaire results of Category 3 'Academic, Disciplinary and Interdisciplinary Issues'. Divergent stacked bar on the left, actual questions in the middle, and percentages with extreme values added together on the right. Source: (Haq 2024).

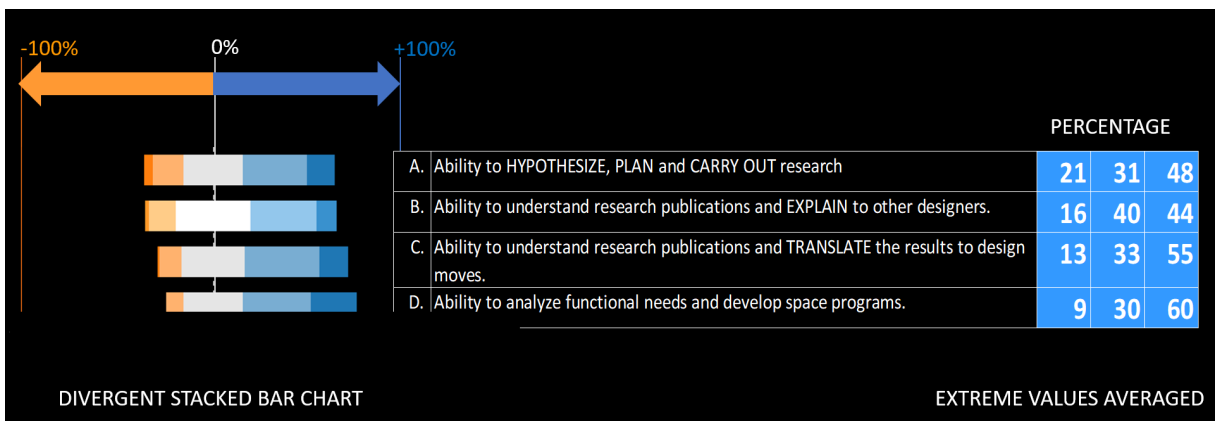


Figure 4: Questionnaire results of Category 4 'Research'. Divergent stacked bar on the left, actual questions in the middle, and percentages with extreme values added together on the right. Source: (Haq 2024).

The results provided some interesting perspectives of the profession about the requirements of a young graduate interested in healthcare architecture. Some of the relevant findings are:

1. Basic knowledge of layout typologies of common healthcare spaces is necessary, but knowledge of specialized healthcare spaces and equipment clearances are not. (Figure 1)

2. In terms of professional preparation, communication and graphic skills were favored by most of the respondents as was experience of working in multi-disciplinary teams (figure 2). Strangely, taking classes in allied disciplines were not supported (figure 3). Regarding healthcare design, participants favored exposure to codes and guidelines (figure 2), perhaps to emphasize that critical navigation among them could be beneficial to good design. They also favored participation in healthcare studios (figure 3).
3. In the section regarding research, all questions received positive responses. The strongest response was that beginning architects needed the ability to understand functional needs and research publications to make design moves. Additionally, from the comment section of the questionnaire, the importance of shadowing/internship was detected.

It is important to keep in mind that the context of the survey was recruiting young architects in healthcare practice. This probably explains why some responses were unexpected. For example, knowledge of history and evolution of healthcare architecture, taking classes in allied fields such as nursing, public health, business etc., and understanding the relationship of healthcare and health design to larger social, political and economic contexts were not deemed relevant. On the other hand, the need for research in the skill set of young architects was validated. This supports a previous survey done by AIA

where “86% of respondents indicated that a client had asked them for a research-based design or to research a specific question that would impact the design. 98% of respondents indicated that they found using evidence allowed them to achieve better design outcomes. 71% of respondents indicated that their firm had engaged a consultant (academic or other outside expert) to help with an evidence-based design project.” (Pentecost, Haq, and Byrd 2016, pp 116)

The three findings from the profession, described above, is instrumental in discussing healthcare design teaching, and this is discussed next.

5.0 HEALTHCARE TEACHING

Healthcare design teaching has existed as post professional programs in several US universities. However, making it part of the professional architecture program is a relatively new initiative, and arguably is in response to the rapidly increasing scope of healthcare design and construction, and the change in mindsets towards responsible design. Clemson University has had a long-standing Master of Architecture professional program that focuses on healthcare. It started as the Healthcare Facilities Planning and Design Studio in 1968, and has since grown to a full-fledged NAAB accredited M.Arch degree. (Allison 2022). Today some schools offer post professional degrees (MS, PhD) in healthcare design, and some have faculty with an interest in healthcare who teach a few courses within the main curriculum. For professional M.Arch students who might want to prepare themselves to get into the expanding field of healthcare design, there are only six schools in the US that offer certificates as part of the MArch program (see table 3).

Table 3: Comparison of courses of six US schools of Architecture that offer a certificate in Health Care Design. Source: (Haq 2024).

Institution	Texas A & M	Kent State	Ball State	Texas Tech University	University of Kansas	University of Illinois at Urbana-Champaign
Name of Program	<i>Health Systems and Design</i>	<i>Health Systems and Facilities Design</i>	<i>Planning and Design of Healthcare Environments</i>	<i>Healthcare Facilities Design</i>	<i>Health and Wellness Architecture</i>	<i>Health and Wellbeing</i>
Credit Hours	16 hours	12 hours, online	12 credits, online	12 credits	15 credits	22 credits
Information source	https://catalog.tamu.edu/graduate/college-s-schools-interdisciplinary/architecture/health-systems-design-certificate/#programrequirements , accessed 1/23/2024	https://www.kent.edu/caed/graduate/certificate-health-systems-and-facilities-design , accessed 1/24/2024	https://www.bsus.edu/academics/collegesanddepartments/online/academic-programs/graduatecertificates/healthcarefacilitydesign , accessed 1/24/2024	https://catalog.ttu.edu/preview_program.php?catoid=17&pooid=12286&returnto=1700 , accessed 1/24/2024	https://arcd.ku.edu/certificate-health-wellness-architecture , accessed 1/28/2024	https://arch.illinois.edu/program-ams-applying/program-areas/health-and-wellbeing/ accessed 5/8/29024

RESEARCH	Health Design and Research (3)	Evidence Based Design in Healthcare (2)	Evidence-Based Design in Healthcare Settings (3) Understanding and Practicing Research in Healthcare Design (3)	Evidence Based Architecture (3)	Evidence-Based Design Research Theories and Methods (3)	Advanced Research in Environment, Architecture and Global Health (4) Advanced Applications in the Built Environment, Architecture and Global Health and Well-Being Social and Behavioral Research in Designed Environments
PATIENT POPULATIONS		Environments of Care and Patient Populations (2) Patient Safety and Systems Thinking (2)	Health Environments for Patient Populations (3)			
ENVIRONMENTS AND SYSTEMS		Environmental Systems and Materials in Healthcare (2) Healthcare Facilities (2)				
STUDIO				Architecture Research and Design (6)	Health & Wellness Capstone Studio (6)	Architecture Graduate Studio (6)
INTERNSHIP					Health & Wellness Internship (6)	

OTHER COURSES	Seminar (1)		Legal, Ethical, and Safety Issues in the Healthcare Industry (3)		Architecture of Health (3) Directed Readings on topics related to Health and Wellness Design (3)	Soc/Beh Factors in Design Gender & Race in Contemporary Arch Special Problems in Health and Wellbeing
MULTI DISCIPLINARY ELECTIVES	Electives. Different disciplines	Electives. Different disciplines		Electives from different disciplines		One elective from another discipline

Certificate programs are a set of courses, usually between 9 to 15 credit hours, that a student can take to build particular skills or knowledge. Generally, they are open to students enrolled in a larger program, or they could be taken as a stand-alone program for any student who wants to participate.

A comparison of the six certificates in the six schools provides an interesting picture of how the teaching of healthcare design is considered by each. (see table 4). First, all schools consider research as indispensable, and they all have at least three hours of research or evidence-based design. Multi-disciplinary electives seem to be the next important aspects as four schools offer them. These courses are drawn from nursing, business, public health, psychology etc. Healthcare studios where health is addressed through design exercises is taught in three schools. Understanding of patient population is also focused in two schools.

Table 4: Relative importance of various aspects of healthcare design in different schools. Source: (Haq 2024).

SCHOOLS	1	2	3	4	5	6
RESEARCH						
PATIENT POPULATIONS						
ENVIRONMENT AND SYSTEMS						
STUDIO						
INTERNSHIP						
OTHER COURSES						
MULTIDISCIPLINARY ELECTIVES						

6.0 DISCUSSION

The conditions today regarding healthcare and healthcare facilities design call for a radical transformation in design thinking where the ability to interact with technical knowledge and scientific evidence is necessary. For this, architects need to be trained in both design and research. This is the biggest challenge in educating architects for a career in the evidence-based healthcare sector. Design is inclusive in the sense that designers must deal with many complexities simultaneously, while research is exclusive in the sense that researchers find ways to 'control' or eliminate extraneous variables. While one is creative, the other is systematic. Thus, the mindset required for these two activities is very different, yet this 'integration' is what this sector demands and what educators strive to achieve. Healthcare design needs people who can use both sides of their brains to integrate creativity and logic. This is not easy.

Regarding research, an important question to be answered is: should architects be producing research, or should they understand and use existing research? Hamilton (2004) has argued that there are four kinds of architect-researchers, or evidence-based practitioners. Level one practitioners know how to find evidence and how to read and understand research publications; and so, they carefully base their design on available peer reviewed literature. Level two practitioners hypothesize expected outcomes of their designs and measure results. Level three practitioners do all that level two practitioners do, and in addition they report their results publicly to inform others beyond the firm and client. Level four practitioners carry out all the above and publish in peer reviewed venues. Thus, their research methods, analysis etc. are scrutinized through the process of peer review. Teaching research to architects in the professional program might be limited to teaching them how to find, evaluate, select, and read research articles with sufficient rigor so that they can translate research findings to design moves. In other words, professional architectural education should teach graduates to be level one evidence-based practitioners. Post professional education is the place where interested health care designers might learn to be level two, three and four.

On another note, healthcare facilities are very complex buildings.

The healthcare environment is a work environment for the staff, a healing environment for patients and families, a business environment for the provision of healthcare, and a cultural environment for the organization to fulfill its mission and vision (Center for HealthDesign 2010, 01).

It is also a place that houses high tech equipment that are constantly evolving and reducing in size, a building type that is controlled probably by more codes than any other type, a building type that consumes enormous amounts of energy and emits great quantities of greenhouse gases, and one with high water use intensity and a producer of enormous quantities of waste. To deal with any one of these issues requires specialized training and experience. So, it is not a surprise that the two credentialing agencies test very different aspects of healthcare design skills. Similarly, different architecture schools have taken on different models in designing their curriculum, perhaps making the best of the expertise that is available in each university.

There seems to be little doubt that the future of healthcare design will be collaborative across disciplines and evidence based. As such, collaboration skills, interdisciplinary understanding, and research seem to be the three most important skills to be taught to architecture students aiming for a career in healthcare design. They need to 'speak the same language' as physicians, nurses, administrator, and other groups, and should understand their priorities. With the same logic, creating better healthcare environments requires those 'other' disciplines to understand the value and effect the environment has in various healthcare outcomes. Credentialing of those professions also should have a component of environmental possibilities and effects. For architects, credentialing efforts must evolve to include interdisciplinary skills, collaboration, and research.

This paper has discussed the evolving nature of healthcare facilities design, the criteria of credentialing and different educational models for professional education available in the USA. It has emphasized interdisciplinary understanding, collaboration skills and research acumen as essential skills for healthcare architects. The credentialing efforts also need to be revised to include these qualities, and credentialing of allied disciplines should also incorporate a component of environmental effects in healthcare.

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