INTEGRATING RESEARCH, EDUCATION AND PRACTICE AT CLEMSON A+H

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DINA BATTISTO | Ph.D
Associate Professor
Graduate Studies in Architecture+Health
Clemson University
OVERVIEW

01 ARCHITECTURE AND HEALTH: GUIDING PRINCIPLES FOR PRACTICE

02 DEVELOPING A PERFORMANCE FRAMEWORK FOR ARCHITECTS

03 DOCTORAL WORK

04 DISCUSSION
ARCHITECTURE AND HEALTH: GUIDING PRINCIPLES FOR PRACTICE

Dina Battisto and Jacob Wilhelm, Editors

Forthcoming Book Published by Routledge in 2019
OVERVIEW

This book assembles architects, academics, social scientists, and more to deconstruct what an architecture for health means. Representing the United States, Africa, Asia, Europe, and Australia, each author brings a new perspective to health and its related architectural response.

AUDIENCE

• Practitioners in the design fields including architects, landscape architects, planners and interior designers.
• Students and faculty in professional architectural degree programs and post-professional research degree programs.
• Healthcare practitioners such as clinicians, healthcare executives and public health advocates
INTRODUCTION

DEFINING AN ARCHITECTURE FOR HEALTH

*Dina Battisto, Clemson University and Jacob Wilhelm, 359Design*

This chapter introduces the concept of architecture as a participant in well-being, building upon Western and Eastern models of care, historical precedents, and the latest research that connects the built environment to health outcomes.

Three scalar themes organize the case studies in this book including:

1. **Design for individuals** (recipients of care)
2. **Design for organizations** (providers of care)
3. **Design for community health** (all those involuntarily effected by the built environment).
1. DESIGN FOR INDIVIDUALS

At this scale, design focuses on the health needs of identifiable groups or population clusters such as children, the elderly, those with mental illness, physical disabilities, and cancer. Case studies will show how architecture can take a tailored approach to the needs of a specific population.

Design for Children (Australia)
Harm Hollander, Conrad Gargett & Associates, Brisbane, Australia

Design for Physical and Cognitive Disabilities (USA)
Brenna Costello, SmithGroup JJR, USA

Design for Mental Health and Behavioural Health (USA)
Mardelle McCuskey Shepley and Naomi Sachs, Cornell University, NY

Design for Cancer Care (Worldwide)
Jamie Mitchell, Maggie’s Centres, UK

Design for Social Change (South Central Africa)
Carolina Larrazábal, Orkid Studio, UK

Design for the Elderly (Austria)
Dietger Wissounig and Birgit Prack, Dietger Wissounig Architekten, Graz, Austria
2. DESIGN FOR ORGANIZATIONS

At this scale, design works to encourage organizations to move toward a better future. A spotlight is put on design interventions that encourage the effectiveness and longevity of the shared mission, purpose, and goals established by healthcare systems and providers.

The Health Systems Role in Promoting Community Health (United States)
Shannon Krause and Kate Renner, HKS

Democratic Design: Super-hospitals (Scandinavia)
Klavs Hyttel, C.F. Møller, UK

Healing Gardens in Healthcare Facilities (Australia)
Katharina Nieberler-Walker, Conrad Gargett & Associates; Cheryl Desha, Cities Research Centre, Griffith University; Omnia El Baghdadi and Angela Reeve, Queensland University of Technology

Care360: An Integrated Ambulatory Care Model (United States)
Heather Albert, HDR, and TBD

Elevating Patient Experience (Singapore)
Mara Baum, AIA EDAC WELL LEED Fellow, HOK International

A Blueprint for Sustainable Design: Weed Army Community Hospital (United States)
Keith Holloway, RLF, Christopher Kiss, Military Health System, and TBD

Dan Abraham Healthy Living Center for the Mayo Clinic (United States)
Pete Smith, FAIA and TBD, BWBR
3. DESIGN FOR COMMUNITY HEALTH

At this scale, design aims to promote the health of people across different geographic areas and focuses on the public health needs of populations within communities. Those passively or involuntarily effected by the built environment are considered when designing for positive health outcomes.

Healthy Cities: From Victory Park to Jade Echo Park (Taiwan)
Philippe Rahm, Philippe Rahm Architects, Paris

The Chemo-garden: A Vision for Outdoor Oncology (Netherlands)
Bart van der Salm, VANDERSALM-aim, Zwolle, Netherlands

Reconciling LEED with Salutogenic-Biophilic Design (Canada)
Stephen Verderber and Terri Peters

Hope after an Industrial Disaster: The Sambhavna Clinic (India)
Jeeth Iype, GoodEarth, Bangalore, India

Designing Prototypes for Social Relevance in Rwanda (Africa)
Patricia Gruits, Director, and Amie Shao, Principal, MASS

Living Buildings: The Bullitt Center (United States)
Steve Doub, Associate and Specification Writer and Jim Hanford, Principal Miller Hull

Restorative Architecture (United States)
Robin Guenther, FAIA, LEED AP, Principal, Perkins + Will

Jade Echo Park, Philippe Rahm Architects
Sambhavana Clinic, GoodEarth Architects
Bullitt Center, Miller Hull
This chapter will discuss important considerations for possible future scenarios of an architecture for health and healing.
DEVELOPING A PERFORMANCE FRAMEWORK FOR ARCHITECTS

Dina Battisto and Deborah Franqui

Forthcoming Book Published by Routledge
OVERVIEW

This book introduces a Facility Performance Framework and a Research Enhanced Architecture Design Process for the purpose of generating knowledge on facility performance. In contrast to focusing on a single phase of the architectural process, the Facility Performance Framework (Facility Framework) is developed in conjunction with a research enhanced architectural process that aims to connect pre-design research, planning and programming, design, construction and post-design research.

AUDIENCE

- Practitioners in the design fields including architects, landscape architects, planners and interior designers.
- Students and faculty in professional architectural degree programs and post-professional
INTRODUCTION
The Need for Research in Architecture to Strengthen Design

As an awareness toward building performance increases, more clients are demanding design decisions based on evidence. In response, it is clear that architects need research to demonstrate the value of design services and advance the field of architecture. For this to occur, architects need to accelerate the development of intellectual capital for both project specific deliverables and a broader knowledge base. A barrier however is the obvious lack of an industry-accepted definition of research and an established methodology for enhancing the design process with research.
OVERVIEW OF BOOK

Introduction: The Need for Research in Architecture to Strengthen Design

Part I: Using Research to Generate Knowledge for the Design Practitioner

Part II: Using Research in Architectural Practices

Part III: Learning the Fundamentals of Research for Design Practitioners

Part IV: The Benefits of Research for Design Practitioners
AMERICAN INSTITUTE OF ARCHITECTS (AIA) DESIGN PROCESS

1. Originate
Discuss, think and explore possibility to build something new

2. Focus
Define the project, scope, vision, purpose, and programmatic requirements

3. Design
Shape architect’s vision through drawings and written specifications

4. Build
Realize project construction with a contractor as an active member of the team

5. Occupy
Occupy the facility, develop satisfaction with the project and ensure terms of the contract were met
PREMISE OF THE BOOK: PERFORMANCE THINKING

OUTCOMES
A clients desired end result

DESIGN
Creation of built artifact
## DESIGN INTENTIONS

<table>
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<th>Design Intentions</th>
<th>Evaluation</th>
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| **1. Pre-design Studies**  
Identify critical issues and outcomes of importance related to facility design through investigative activities  
> Seeking  
> Questioning | **5. Post Occupancy Evaluation**  
Evaluate design solutions from project requirements, expected outcomes and design objectives  
> Assessing  
> Measuring |
| **2. Planning and Programming**  
Identify design problem and related facility planning and programming criteria  
> Identifying  
> Documenting | **4. Construction**  
Realize design concepts through facility construction; Design actualization  
> Building  
> Documenting |
| **3. Design**  
Solve design problem through schematic and design development  
> Creating  
> Documenting |  |

### FACILITY PERFORMANCE FRAMEWORK COMPONENTS

- **Outcome**
- **Design Objective**
- **Design Strategy**
- **Design Solution**
- **Measures and Metrics**

### TRANSLATION AND KNOWLEDGE MANAGEMENT

RESERACH ENHANCED ARCHITECTURAL DESIGN(READ) PROCESS
### FACILITY PERFORMANCE FRAMEWORK COMPONENTS

<table>
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<th>Outcome</th>
<th>Design Objectives</th>
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Buckingham County Primary + Elementary Schools

Introduction

"The former middle and high school buildings, built in 1954 and 1962 respectively, are transformed into a modern learning campus for K-5 students with the aim to address the growing concern of student health and well being. By designing the school from a holistic perspective that includes the dining experience as an educational opportunity, the school cafeteria, kitchen, and servery have been redefined as an important educational experience while retaining the key food service functions. The enhanced programming includes a teaching kitchen, innovative food and nutritional displays, an open servery to promote demonstration cooking, a food lab – small group learning lounge, scratch bakery, dehydrating food composter, ample natural daylight, flexible seating arrangements, and outdoor student gardens."1

Awards:

- 2014 Education Facility Design Excellence Award AIA Committee on Architecture for Education (CAE)
- 2014 Education Sector - Design B - Award Shaw Contract Group
- 2014 Excellence Award Inaugural Award AIA Central Virginia
- 2014 Honor Award For Design Excellence In Architecture AIA Central Virginia
- 2014 Innovation Gold Award Virginia Chapter of the Association for Learning Environments
- 2014 Jury’s Choice For Outstanding Project Of The Year Greater Virginia Green Building Council
- 2013 Award For Excellence In Architecture AIA Virginia
- 2013 Outstanding Project Learning By Design
- 2013 Project Of Distinction Lee J. Bounds Award Association for Learning Environments
- 2012 Prize for Design Research + Scholarship AIA Virginia
- 2012 Gold Design Award Virginia School Boards Association
- 2012 People’s Choice Award Virginia School Boards Association
- 2012 3rd Place in Childhood Obesity Challenge American Journal of Preventative Medicine

Outcomes

**Student Health and Well-being**

"The transparent treatment of food in the school, from the gardens to the open servery, allows students to gain awareness about how their food grows, how it is prepared in the kitchen, and how it fuels their activity and learning. These educational opportunities can create shifts in food culture and improve student health and well being."2

**Environmental Stewardship**

"The site design promotes the importance of the natural environment in the daily experiences of students. This is enhanced through student participation in the remedial ecological processes and engineering functions of the school’s built environment. The site highlights the natural resources of the area (and) other educational opportunities abound in the landscape."2

2http://www.vmdo.com/buckingham-county-primary-and-elementary-schools/
### Design Objectives
- **Promote Physical Activity**: Flexible and customizable spaces within STEM spaces and outdoor areas, promoting active movement and learning.
- **Engaged Learning**: A flexible and customizable environment that inspires and encourages student creativity.
- **Promote Healthy Eating**: Accessible kitchen facilities and hands-on learning experiences.

### Design Strategies
- **Design an ecosystem for smart play and physical activity throughout the site**: Including bikeways between indoor and outdoor spaces.
- **Design flexible and customizable spaces**: That inspire creativity.
- **Use wayfinding and signage**: As an alternative learning method to encourage grade level identity and to extend a healthy lifestyle message throughout the school.
- **Enable visual access**: To kitchen facilities and the treatment of food in order to promote passive supervision of food production and preparation.
- **Use building and landscape features**: To promote awareness of healthy and sustainable food practices coordinated with extra-curricular activities to engage the school community.

### Design Solutions
- **Outdoor dining terrace**
- **Garden spaces**: Promote demonstration cooking, including outside windows that line the core bakery and give a glimpse of the baking process.
- **Visual & physical connections**: Between the kitchen, dining, & outdoor areas.
- **Complementary hands-on kitchen lab & food lab lounge**
- **Complementary hands-on kitchen lab & food lab lounge**

### Evaluation
#### Health & Wellness Received At
- **Buckingham Elementary and Primary School Health and Wellness Action Plan for 2015-2016 achieved a perfect score**: The school's plan is comprehensive and includes SMART goals, includes statements of specificity, and uses data and strategies to fulfill an observed need in the school community.

#### Increase in Nutrition Knowledge
- “In a series of student reflection drawings there was a remarkable change from pre- and post- assessment with children choosing vibrant colors, shapes, garden designs and a variety of fruit and vegetable preferences” after being immersed in their new environment.

#### Catalyst for Social and Change
- Staff created new after-school education programs and incorporated healthy eating messages into daily announcements. They also took charge of their overall health with incentivized contests, cross-fit programs and daily walking routines using school grounds and gymnastics.

### References
Village Family Medicine

Introduction

"The mission of the new family practice prototype for Spartanburg Regional Health System is to provide high-quality care while considering health in a global sense, from the scale of the individual to that of the larger community and environment. Sustainable design and operations inform efficient processes, articulated through a new model for primary care. The new family practice prototype will match care delivery with patient expectations through the utilization of the latest technologies, enabling fluid communication and information sharing to ensure continuous, efficient and effective treatment. The prototype will serve as a model for patient and family-centered care, empowering patients, their families, and caregivers in the promotion of public and environmental health."

"Recognizing the impact of design excellence on patient care, the firm’s Healthcare Studio led a partnership between McMillan Paduan Smith, NDO Health, Spartanburg Regional Healthcare System and Clemson University School of Architecture to rethink the built environment of family medicine. Through a multi-disciplinary approach to planning and programming, the partnership developed a patient and family-oriented, process-driven practice that addresses circulation issues relative to clinical staff and patient traffic, maximized natural light and views to the exterior and integrated wireless technology. The design introduced a new standard of innovation in an operationally excellent practice with optimized workflows and support for patients and their families through clear, intuitive design."

Outcomes

- Patient and Family Experience
- Patient and Family Comfort & Control
- Workflow Efficiency
- Flexibility and Adaptability

Design Objectives

- Positive Experience
  "Providing a positive experience for patients, family, and staff was central to the design of the office. The design intent aimed to support patient and family-centered care and a positive work environment in order to align care delivery practices with patient and staff expectations."

- Operational Efficiency
  "The main design goal of the project was to support operational efficiency through the adoption of efficient work processes and the integration of functional and flexible spaces planned to accommodate changing needs in technology and care practices over time."
## Positive Experience

### Design Objectives
- Provide a natural, therapeutic environment
- Provide access to daylight in public areas
- Provide visual and physical access to nature in public areas
- Provide a public open area with programmed activities
- Provide comfortable furniture in public areas

### Design Strategies
- Warm and natural colors in public areas
- WINDOW FEATURE
- Color art work with nature scenes
- Windows in public areas
- Outdoor work stations for public use
- Nutrition with educational material
- Windows throughout facility
- Multiple comfortable seating options

### Design Solutions
- Regular couch instead of arm bed
- Removable and modular furniture in assessment rooms
- Acoustic walls and door seals in assessment rooms
- Translucent glass door panels in assessment rooms
- Windows in treatment rooms
- Warm, natural colors in patient care areas

### Evaluation

#### Patient and Family Experience
- Overall satisfaction with patient and family experience:
  - Staff: 100%
  - Patients/Family: 99%

#### Access to Daylight
- Percent of area with access to daylight:
  - First Floor: 30%
  - Second Floor: 35%

### Illustration of Design Solutions

- Warm Color Palette
- Water Feature
- Local Artwork
- Windows
- Computer Work Stations
- Educational Stations
- Flexible Seating

### Resources
- Overall first impression
- Positive visual environment
- Access to daylight in public areas
- Furniture comfort in public areas
- Calming and relaxing atmosphere
Operational Efficiency

**Design Objectives**

- **Workflow Efficiency:**
  - This dimension examines design features such as the organizational layout of the facility and adjacencies within the office. It includes spatial layouts as well as travel distances.

- **Flexibility and Adaptability:**
  - This dimension relates to how design features such as infrastructure may accommodate changes over time while minimizing service interruptions.

**Design Strategies**

- Separate private care from the more public patient/family care.
- Provide direct access to patient care areas for patients and staff.
- Organize the design of the clinic around optimized materials flow.
- Organize the design of the clinic around optimized patient and staff flow.
- Provide flexibility in patient care areas to accommodate rapidly changing technologies and care-delivery methods.

**Design Solutions**

- **Separate private care from public patient/family care**
- **Provide direct access to patient care areas for patients and staff**
- **Organize the design of the clinic around optimized patient and staff flow**
- **Organize the design of the clinic around optimized materials flow**
- **Provide flexibility in patient care areas to accommodate rapidly changing technologies and care-delivery methods**

**Evaluation**

- **Follow Up Visit:**
  - Average time spent with Provider: 15 min (67%)
  - Average time spent with Nurse: 15 min (67%)
  - Average Wait Time: 24 min (67%)
- **New Visit:**
  - Average time spent with Provider: 20 min (67%)
  - Average time spent with Nurse: 12 min (67%)
  - Average Wait Time: 26 min (67%)

**Resources**

- **Illustration of Design Solutions**
  - Public Zone Access Door
  - Staff Zone Access Door
  - Provider Peds
  - Controlled Staff Work
  - Supply Storage
  - Patient Care Areas
  - Patient + Family Support
  - Staff Support
  - Clinical Support

- **Step 1:** Arrival, Greet and Class List
- **Step 2:** Patient Interview
- **Step 3:** Decimalization
- **Step 4:** Out-Rooming

- **Acute Visit:**
  - Average time spent with Provider: 15 min (67%)
  - Average time spent with Nurse: 14 min (67%)
  - Average Wait Time: 23 min (67%)

- **Clemson A+H Alumni 50th Anniversary Reunion | 2018**
DOCTORAL WORK
ROLE OF THE PHYSICAL ENVIRONMENT ON TEAM-BASED PRIMARY CARE IN THE MILITARY HEALTH SYSTEM (MHS)

WILLIAM LEWIS
Doctoral candidate

After Graduation: US Army Health Facility Program Manager in Falls Church, VA

BACKGROUND

- In 2013, 18% of all primary care practices were PCMH certified (NHS Report, 2017)
- The PCMH clinic trend continues to grow throughout the Nation (NCQA, 2017)
- Major healthcare organizations are exploring different ways the physical environment supports team-based care
  - (Vickery et al., 2015)
- Little is known about how the design of PCMH clinics impact the delivery of team-based care

AIM

To understand the perceptions of clinical staff concerning how different clinic environments influence the delivery of team-based care

RESEARCH QUESTION

1. How are primary care environments planned and designed in the Military Health System (MHS) to support team-based care?
2. What are the strengths and weaknesses of three different team-based clinical modules for delivering team-based primary care?
3. How could the team-based clinical module improve to support future needs for team-based care?
4. How is the team room used and what are the environmental requirements with regard to the room?

RESEARCH APPROACH

- The “clinical module” is a physical space that supports clinical core teams in delivering patient care
- A “clinical module” includes spaces for patient care and shared workspace for the clinical core team
  - (Dubose, Lim, and Westlake, 2015)

Social Constructivism
Qualitative
Case Study

Patient Care Rooms (Exam, Consult, Treatment, Screening)

Team Workspace

Clemson A+H Alumni 50th Anniversary Reunion | 2018
ROLE OF THE PHYSICAL ENVIRONMENT ON TEAM-BASED PRIMARY CARE IN THE MILITARY HEALTH SYSTEM (MHS)

WILLIAM LEWIS
Doctoral candidate
Major in the United States Army

FINDINGS

• Recent primary care clinics were not originally designed to accommodate the PCHM model, resulting in hybrid layouts

• The three cases demonstrated strengths for proximity of staff workspaces to exam rooms, while at the same time breached staff privacy

• Team-based clinical modules can be improved by separating staff and patient areas through the organization of spaces

• The team room needs to strike a balance for supporting both collaboration and focused-work

CASE STUDY

DATA COLLECTION

• Floor Plan Analysis
• Photographs
• Team Room Observation
• Interviews with Planning & Design
• Interviews with Administrators
• Interviews with Clinical Staff
THE INFLUENCE OF WINDOWS ON SURGEONS’ STRESS

Christoph KISS
Doctoral student
Third year

Background
Surgery is performed in a complex and intense environment, with the surgeon enduring a significant amount of occupational stress. Operating rooms (ORs) in the United States are typically windowless spaces that rely on artificial lighting and mechanical ventilation.

Research Goal
This quasi-experimental study aims to assess the relationship between access to exterior views and daylight through windows in ORs and surgeon stress.

Research Design
APPROACH: Quantitative
STRATEGY: Quasi-Experiment
DESIGN: Reversal Time-Series, Single Subject

Sample
25 Operating Rooms
Academic Medical Center, Northeastern United States
• 3 operating rooms have windows with direct views
• Each window has operable black-out shades
• Cardiac & Vascular Surgical Specialties

Study Design
Each surgeon subject serves as his/her own control

Data Collection

Expected Findings
• Learn if surgeons benefit from or are distracted from access to windows during surgery
• Understand how the effects of windows on stress differs by procedure duration

Implications
• U.S. healthcare facility guidelines will continue to support research for occupational health caused by environmental conditions
• Operating rooms for open surgical procedures may receive special design guidance differing from minimally invasive surgery rooms

After Graduation:
Director-level position in the United States Army, Health Facility Planning Agency (USAHFPA) in Falls Church, Virginia

Christopher Kiss
Doctoral Student
Third Year

Clemson A+H Alumni 50th Anniversary Reunion | 2018
DISCUSSION
NEXT STEPS

1. What skills are you looking for in new professional graduates related to research skills?

2. How can we foster research collaborations between academic and practice?

3. What type of research would most benefit architectural practices?

4. In what format is research most useful for practitioners?

5. How do you implement research in design projects?
THANK YOU!