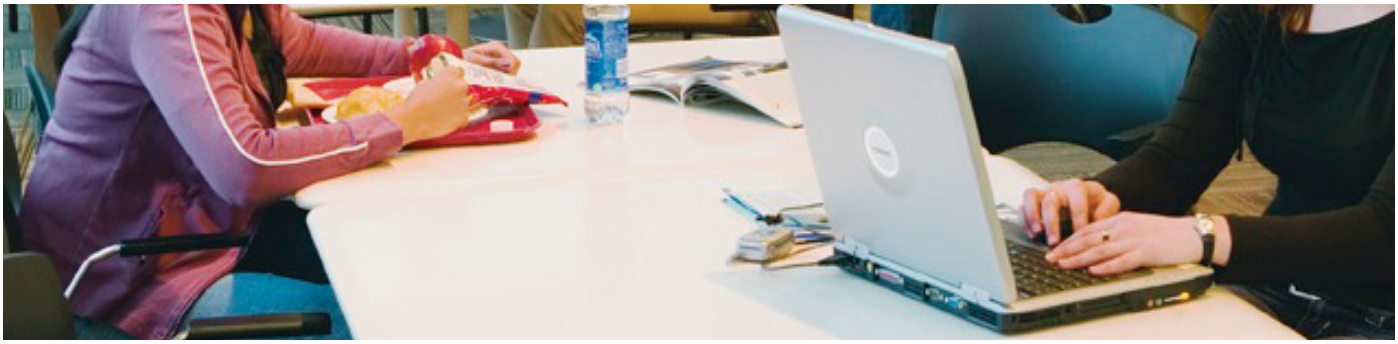
Enriching the Learning Experience

INTEGRATING NEW TECHNOLOGIES INTO FLEXIBLE LEARNING SPACES

by Deanne Beckwith, Lori Gee, Mark Meagher, and Scott Pobiner

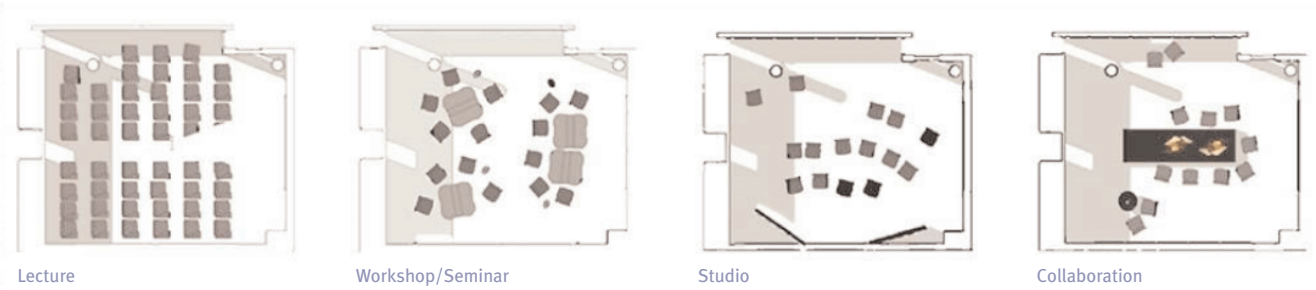


Using digital media to collaborate in person and remotely is increasingly important in higher education. Given the increasing use of digital design methods and remote collaboration in teaching and presentations, rooms equipped to handle this technology must be easily adaptable in order to empower mobility, technology, and people. These spaces must also be resourceful, balancing functional, fiscal, and pedagogical needs. Intelligent, innovative designs for spatial configuration, lighting, furnishings, and audio-visual systems can provide the flexibility needed for adaptable, resourceful spaces.

Led by Professor Spiro Pollalis, The Center for Design Informatics (CDI), a research center at Harvard Graduate School of Design (HGSD), is on the forefront of the study of collaborative spaces that support effective teaching and learning in new technology settings. CDI recently conducted an experiment with Herman Miller, Inc., to create a multi-use, flexible classroom design in the HGSD, Gund Hall.

The Media Space Classroom project was developed to address changes in design education at HGSD precipitated by the increasing popularity of digital design methods. It was necessary to address current needs for remote collaboration, teaching with digital media, and digital design presentations; it was also essential to anticipate future needs. In addition, at the time of the project the school was faced with a severe space shortage, and it was a requirement for this project to meet multiple needs and provide a room sufficiently flexible to accommodate several different types of activity during the course of a single day.

The challenge was to create a space that can be rapidly transformed, allow frequent transitions between diverse uses, and provide a place to test and evaluate new techniques that support highly interactive, multiuser digital media presentations. The environment needed to support integration of analog and digital display. It also had to be continuously responsive to emerging technologies to ensure future compatibility of the space with new uses, methods, and technologies.



Learning is dynamic—given teaching methods and the type of information involved—so effective spaces must adapt to various learning styles.

Criteria for Change

Design education, as it is carried out at institutions such as HGSD, is based on the constant production of drawings, models, sketches, and other representations of student design ideas. Most buildings created to house schools of design contain 'studio' spaces optimized for the production of design work, and rooms designated for the presentation and critique of this work.

Classrooms are also necessary for instruction in the many technical skills and concepts that form an essential part of the education of a design professional. Digital design has reduced the distinction between studio and classroom activities. To support this blurring, the flexibility being sought in this project had to fluidly support as many of the design education activities as possible, while expanding to support informal, unscheduled collaboration.

In addition to the criticism of student work provided by instructors, most programs of design education emphasize the importance of peer-to-peer learning: the informal discussion of work in progress and sharing of knowledge among students. In schools where students occupy a shared studio workplace, learning from one's peers takes place through the constant visibility of design work, providing a basis for students to discuss design ideas and techniques.

Over the past two decades, digital design methods have become an essential component of design education, in many cases replacing physical artifacts in the studio as the product of student work. Drawings that would have been created using pen or pencil in the past are now drafted using one of the many CAD (computer-aided design) applications. Virtual models created in 3D modeling applications are increasingly used in place of models constructed by hand for both design development and presentation.

Communication technology has also transformed design education. Video conferencing and other modes of remote communication have opened the possibility of collaboration over a distance as well as diverse variations on distance learning. Since much of a student's design work can be done digitally anywhere, having a purposeful place to come and exchange his or her ideas regularly and dynamically is critical to retaining this important element of discussion and critique.

What We Know

Given the increasing use of digital design methods and remote collaboration in teaching and presentations, rooms equipped to handle this technology must be easily adaptable and resourceful.

Adaptable spaces support the people, places, and activities within them. The demands placed on learning spaces evolve along with methods of teaching and styles of learning. Lectures are accompanied by class dialogue; memory and recall are balanced with discovery and critical thinking.

Learning spaces, too, must keep pace with the multitasking nature and habits of students. A mixture of relaxed discussion and study areas, spaces that expand or contract depending on need, and private or group spaces can coexist in the same place. Furnishings need to move and morph and support the immediate task at hand.

An adaptable space also allows for personal control. Teachers can manipulate the environment depending on the assignment or activity for that day. Students, also, may want to rearrange furniture and adjust equipment in order to work in larger or smaller teams. Learning is dynamic and ever-moving based on the teaching style and the type of information being integrated; therefore, the idea of one media type and a fixed front is often restrictive.

These spaces must also be resourceful. It is no small challenge to balance fiscal, functional, and pedagogical needs.

Resourceful space promotes wise use of assets now and into the future. Enriching the experiences and opportunities of students and faculty with a tight budget calls for resourceful planning.

But there are ways to plan and allocate resources wisely and with an eye to the future. Flexibility in spaces and furnishings adds long-term value, as environments can adapt without having to change the architecture. Purposeful design allows for future changes in infrastructure and technology without requiring significant renovation.

Standards programs can simplify management of multiple facilities among several campuses. And electronic procurement can help streamline planning and specification.

An innovative ceiling grid provides on-demand virtual rewiring for equipment and lighting.

A horizontal, touch-control digital display offers a place to meet and collaborate around information.

Solution Scenario

Innovative designs for spatial configuration, technology integration, lighting, and furnishings can be aligned to provide the flexibility needed to achieve spaces that are adaptable and resourceful.

Spatial Configuration. Herman Miller, Inc., provided a ceiling-based modular electric and lighting system called Convia™. It allows plug-and-play movement and instant change of access to power and positioning of equipment and lighting in a space without the need for an electrician.

CDI chose to use this innovation, still in development at the time, because of its radically adaptable capabilities. Its structural grid supports equipment, suspension of lights, speakers, webcams, and an array of experimental digital and analog display elements. The intelligent network also allows various users to program and manage settings for the space conveniently and easily.

Professors can walk into the room and touch a single button to reach their selected ambience. Students can change settings for presentations and reviews, without affecting the professors' chosen "scene settings." This gives all participants more control and choice in matching their needs. Moveable walls that are rolled out attach to the grid and act as barriers, passageways, even display walls.

Lighting Design. The final lighting scheme combined an array of low-cost, ceiling-mounted fluorescent lamps with Convia track lighting and eight pre-existing wall-washer lamps (four on either side of the room). All three types of lights were connected to the Convia electrical system and configured into lighting schemes.

The lighting in the room is typically a combination of direct spotlighting and more diffuse ambient lighting, which creates comfortable and varied lighting for a wide array of activities. A test area for a prototype ceiling array that combines LED lighting and a sculpted ceiling plane allows a "million colors of light" for mood changes and creates an atmosphere for better screen viewing.

Technology Integration Design. This final phase of the project needed to incorporate a range of technologies in a way that had not previously been attempted. More specifically, the final design proposed a room-based audiovisual system with a control system that would be accessible to nontechnical users of the room, and which would not require a centralized console.

Existing solutions to support these needs were not readily available, so CDI worked with evolving industry leaders to create what is essentially a next-generation distance learning capability for multiple users on various continents. It allows them to exchange data and drawings real-time in collaborative work.

Plasma Table. In an effort to bring the audiovisual and furniture goals of the Media Space together in planes that are not only vertical but also take advantage of a natural tendency to collaborate around information, CDI requested a horizontal display unit. Herman Miller, Inc., created a support structure for an existing plasma screen and a touch-sensitive overlay made by SMART Technologies, Inc.

By developing a horizontal, touch-sensitive surface for displaying digital media, the Interactive Plasma Table provides an opportunity to reorganize group meetings that involve digital media to better suit natural human interaction. While using the table, groups of three or more people have found it easier to interact with the media as well as discuss issues with one another.

In cases where other types of media are needed, such as physical models or paper drawings, the table provides a common surface where all discussion can take place so that group members can remain focused on both digital and physical artifacts simultaneously. When combined with mobile carts outfitted with flat screen monitors for virtual interaction with remote peers, the interactive capability naturally expands beyond physical constraints to provide a stimulating and effective means of communicating information.

Furniture Selection. There were three major requirements for furniture in the space. First, the furniture had to be mobile and changeable with ease so that the space could, within minutes, be transformed from a lecture space for 60 people to a seminar space for 12 participants.

Second, the furniture needed to be sturdy enough to support constant use and occasional abuse. Third, all of the new furniture had to fit within the new storage space (a 3-by-20-foot area)

An array of display-on-demand media allows participants to share content anytime, anywhere.

located behind two large sliding walls designed to provide storage without detracting from the usable area of the room.

Herman Miller, Inc., developed and implemented a plan that provided the space with furniture that could suit these needs. The facility department's maintenance crew would never have to push large banks of furniture down corridors again. The room could be quickly and easily reconfigured without residual furniture cluttering the space.

This experimental space effectively integrated pedagogy, technology, and human needs for more effective learning outcomes. The exploration of what is possible in this one space at Harvard will inform other projects the university undertakes with new ideas to enable learning and creativity.

The facility manager responsible for the HGSD reports that the Media Space Classroom, once the most unpopular classroom in the school, has become the most frequently requested, wait-listed space in the building. The proven flexibility of this environment will continue to evolve and change, adapting to the future needs of its teaching staff and students.

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Credits

As consultant to Herman Miller for 16 years, **Deanne Beckwith** specializes in Advanced Development and implementation of new concepts from early development through commercialization. Her experience includes key healthcare strategies, systems furniture programs, global project management, and user experience facilitation. An industrial designer, she serves on the Design Management Institute Advisory Council.

Lori Gee leads Herman Miller, Inc.'s Education Solutions Team and the company's focus on learning trends and higher education environments. This work guides the company's overall development of unique solutions for learning environments. As a design practitioner with 20 years experience in using space as a strategic tool, she has helped many organizations and institutions set meaningfully different directions for improved results. Her work is a "whole-systems" approach to planning and creating learning spaces, considering the relationships of all aspects of space.

Before joining the Media and Design Lab at the Ecole Polytechnique Fédérale de Lausanne (EPFL), **Mark Meagher** was a designer and program manager at the Center for Design Informatics (CDI), a research facility at the Harvard Graduate School of Design. Mark's projects at Harvard focused on the creation of software and spaces to support design learning and work. He is a cofounder of IDCollaborative, a company dedicated to exploring creative applications of architectural technology.

Scott Pobiner is a Doctoral Candidate at the Harvard Graduate School of Design and cofounder of CAPO Design, a design firm focused on the development and integration of interactive, architectural, and Web-based design solutions. His dissertation is titled "Making Space For Digital Media in Education: Integrating Shared Digital Displays into Classroom Space". In 2005, he was an adjunct faculty member at the Stevens Institute of Technology, Product Architecture Lab.

Sheila Kennedy, principal of Kennedy & Violich Architects (KVA) in Boston, and her team assisted in the development of the Media Space Classroom. Kennedy's work on this project is based on her ongoing research into incorporating efficient and sustainable technologies into architecture.