LEARNING PER SQUARE FOOT

Learning Per Square Foot:

Shifting the Education Paradigm

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EXECUTIVE SUMMARY

Preparing tomorrow's leaders is a responsibility all Americans share. In the face of global demands, a renewed sense of urgency exists about the preparedness and capabilities of today's young adults. It has spawned a very public debate about education, reform, and planning effective learning spaces.

Effective classroom design is indeed a crucial element in learning. Additionally, learning opportunities can be extended well beyond the classroom to create entire learning environments that support student success. Despite the transformations necessary to equip students with 21st century skills, planners and decision-makers at schools and institutions continue to design classrooms and campuses that reflect outdated modes of teaching.

This paper examines the opportunity to explore educational space design using a "learning per square foot" concept, thereby improving student success, creating a community of learning, and strengthening our country's competitive position for the future.

INTRODUCTION

There is little doubt that concerns over the United States' educational system has reached critical mass. Questions about our country's ability to compete in a global marketplace have positioned education squarely under the microscope.

As the future of the U.S. labor market is examined, a widening gap between the skills of our future leaders and projected labor needs is exposed. Numerous industry reports over the last several years all point to a continuing decline in education as a chief cause. Indeed, signs that the U.S. is failing to meet its obligation to prepare millions of young adults to join the workforce are reflected in a wide range of quantifiers—from testing scores to dropout rates to college completion rates.

While very few would argue with the need for changes in education, the broad consensus is that change is not occurring fast enough. New models of pedagogy, or teaching practices, are beginning to appear but advances in technology and the resulting learning styles of today's students have far outpaced and outgrown changes in teaching methods. Greater action is urgently needed.

It's "Time to Paradigm."

The need to transform education has a profound effect on the planning and use of space. Conversely, classroom design can also serve as an agent for effective changes in education, supporting a diversity of learning styles, new teaching styles and enabling new ways of learning.

There are also opportunities for learning that go beyond the classroom that good planning and space design can help harness. Important is integrating planning for classroom spaces with planning for informal and social spaces across a school or campus to establish an entire learning ecosystem, one that enables learning to take place any time, anywhere.

Educators, planners and designers face a unique opportunity to collaborate on the adoption of entirely new design principles—principles that leave behind the familiar practice of designing space by headcounts. Initiatives that instead reflect the trend to more student-centered, collaborative and group learning. With a focus on space effectiveness rather than just greater capacity and throughput. And that foster learning via community.

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If space planning through students-per-square-foot formulas no longer support effective learning, what then is the alternative? Could the concept of "learning per square foot" replace archaic mathematical formulas to help drive a contemporary and successful learning environment? What would a learning-per-square-foot space design plan look like? How could it be measured?
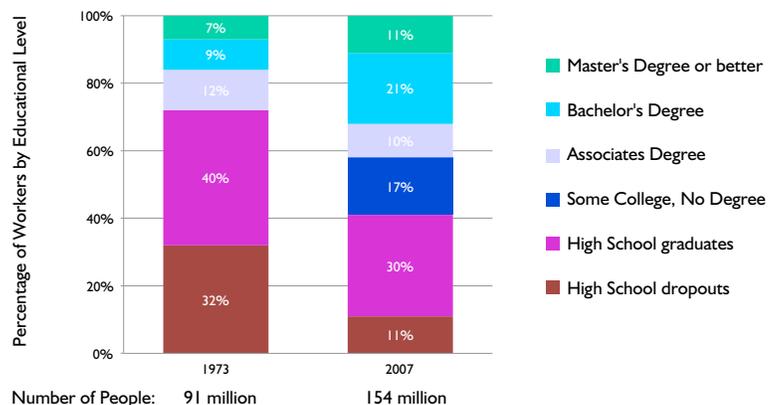
To explore the possibilities and create optimal learning spaces based on "learning per square foot," it's important to first recognize the present realities of our knowledge-based economy, the characteristics of today's student body living in a technology-rich world, and our current trajectory for the future.

TIME FOR PARADIGM SHIFT

Indications at every turn point to the need for a paradigm shift now. Numerous arguments for drastic changes to our educational system can be found in a recent breakthrough report Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century. A two-year effort by the Harvard Graduate School of Education, the report examines the many reasons why America's young adults are not prepared for the workforce and paints a grim picture of the current crisis:

• The Center on Education and the Workforce at Georgetown University projects that the U.S. economy will create some 47 million job openings over the 10-year period ending in 2018. Nearly two-thirds of these jobs are estimated to require that workers have at least some post-secondary education. The paradox is that even though young people understand they need post-secondary education to make it in 21st century America, high percentages continue to drop out of high school and college.

Figure 1 Since 1973, jobs that require at least some college experience have exploded while opportunities for those with just a high school education have shrunk dramatically

	1973	2007
Master's Degree or better	7%	11%
Bachelor's Degree	9%	21%
Associates Degree	12%	10%
Some College, No Degree		17%
High School graduates	40%	30%
High School dropouts	32%	11%

Percentage of Workers by Educational Level

Number of People: 91 million   154 million

Source: March CPS data, various years; Center on Education and the Workforce.

•Every year in the U.S., some one million students drop out of high school before earning a diploma. In addition, only about 40% of Americans have obtained either an associate's or a bachelor's degree by their mid-twenties. Roughly another 10% have earned a certificate. Only 56% of those enrolling in a four-year college attain a bachelor's degree after six years, and less than 30% of those who enroll in a community college succeed in obtaining an associate's degree within three years.

Figure 2 College for All does not mean everyone needs a B.A.
Even in this decade most jobs do not require a B.A.

- HS degree or less
- Some College/A.A. degree
- B.A. or better
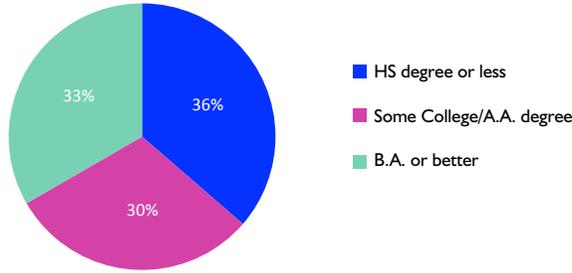
Source: March CPS data, various years; Center on Education and the Workforce forecast of educational demand to 2018.

•Additionally, the U.S. now has the highest college dropout rate in the industrialized world despite spending $400 billion annually on post-secondary education. The return on this investment is clearly not optimal.

Figure 3 The U.S. has fallen from 1st place to 13th in high school graduation


- 2000s
- 1990s
- 1980s
- 1970s
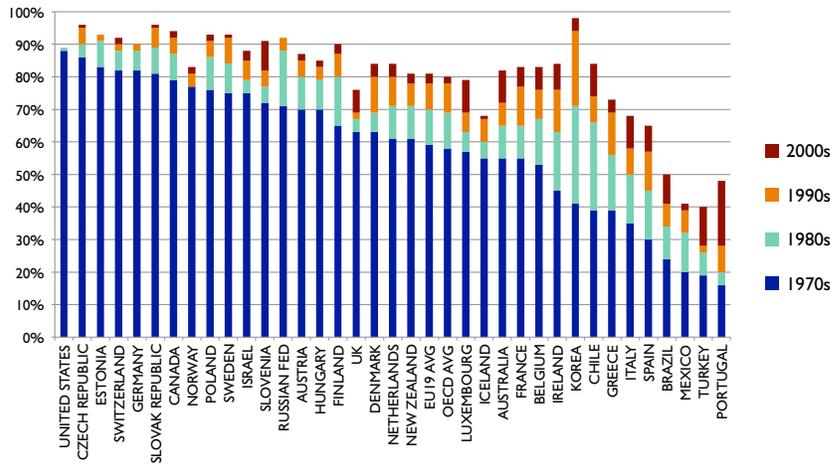
Note: Approximated by percentage of persons with upper secondary or equivalent qualifications in the age groups 55-64, 45-54, 35-44, and 25-34 years.
Source: Organization for economic Cooperatin and Development.

•Increasingly, U.S. employers complain that today's young adults are not equipped with the skills they need to succeed in the 21st century workforce. Some have concluded that high school graduates are deficient in oral and written communication, critical thinking and professionalism.

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•Among the stark realizations in the Pathways project are the reasons behind our nation's high dropout rates. Chief among them is that students fail to see the connection between their studies and job market opportunities. In other words, their education does not fully resonate for them because it has little relevance.

While illustrating the state of education in the U.S., the Pathways report also highlights the efforts industrialized countries have made to improve education and take the competitive lead in the global marketplace. One most notable example is the longstanding emphasis on vocational education and apprenticeships particularly throughout Europe. Many countries integrate classroom and workplace learning starting in 9th and 10th grades. Such vocational instruction helps transition students directly into the labor market well prepared and well trained.

Figure 4 In many European countries, over half upper secondary students are in vocational educational and training
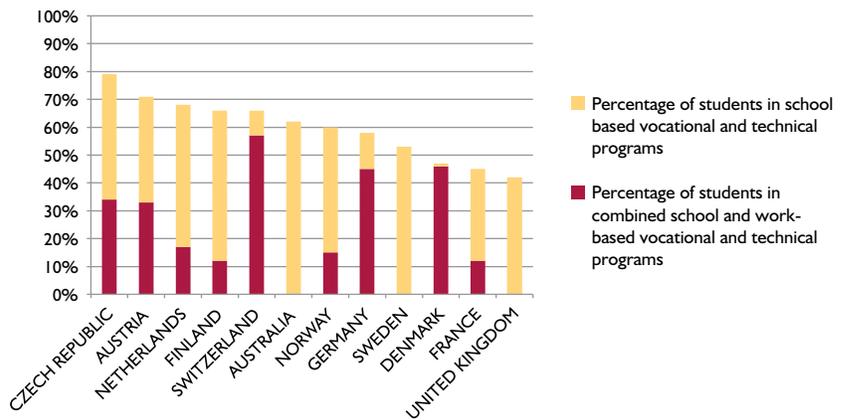
Source: OECD (2008), Education at a Glance 2008, OECD indicators, Table C1.1, OECD, Paris.

As the clarion call continues for changes in how education must be delivered to become more effective, space design can greatly support educational changes and work toward keeping students engaged in learning. Changes to teaching methods and to classroom and campus designs can help students connect the dots.

It can and it must.

As the report states, "Continuing on our current course, by placing almost all our bets on classroom-based pedagogy, is likely to produce little more than the marginal gains we've seen over the past two decades."

Yet to make the right paradigm shift in education, we must first deepen our understanding of both the current and incoming "student body." To design new learning spaces, we must likewise consider the learner at the center of the design.

UNDERSTANDING THE DIGITAL GENERATION

Never before has the world been so accessible and never before has one generation carried that world of information in the palms of their hands. That generation is today's students—the Millennials—the first to come of age in the new millennium. They are also known as Gen Y, Generation Next, the Net Generation and the Echo Boomers.

There is no consensus over the number of individuals that fall into the Millennial group. Depending on the source and the birth dates cited, there are between 50 million and 80 million of them in the U.S., primarily born in the '80s and '90s (1982-1995 is often cited).

Throughout 2010, the Pew Research Center explored more deeply into the behaviors, values and opinions of the teens and twenty-somethings that make up the Millennial Generation. The Center conducted a series of nationwide surveys and analyzed government demographic, economic, and education data. The result is a portrait of a generation that's confident, connected and open to change; a generation that is also team-oriented, self-expressive, upbeat, and more ethnically and racially diverse.

The Millennial Generation – self-expressive and steeped in digital technology and social media.

Millennials are uniquely different from other generations due to their profound digital exposure. These future leaders are steeped in digital technology and social media. They wear more technology than some adults own or use. The Internet to them is what television was to Boomer youth. Just how ubiquitous is technology to today's students? Among the Center's findings:

- They treat their multitasking handheld gadgets almost like a body part, for better and worse.
- Seventy-one percent of teens age 12-17 have a cell phone and more than 8 of 10 Millennials say they sleep with their cell phones.
- Thirty-eight percent send text messages daily while a quarter send daily messages via social networks.
- Ninety-three percent of them go online.

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- Ninety-seven percent play computer, web, portable, or console games and 50% played games "yesterday."

According to the Center, it's not just having gadgets that make this generation so unique, "…it's the way they've fused their social lives into them."
- Three-quarters have created a profile on a social networking site.
- One in five have posted a video of themselves online.

Clearly today's technology-driven, wired students are learning in unprecedented times, at the speed of a "click" or "tap." They are vastly different students than those of previous generations, with different capabilities, distinctively hardwired for learning that's driven by technology. They expect 24/7 access to information and the ability to study or tackle homework anywhere, any time.

> Today's students expect 24/7 access to information and the ability to study or tackle home-work anywhere, any time.

In contrast, their parents had no cell phones, no MP3 players, no computers, no Internet. It's a perspective many of today's teachers also share having been classmates with their students' parents. Similarly, classrooms of the previous generation had no technology beyond an overhead projector.

Sadly, with the exception of a computer or two in some classrooms, not much has changed for these unique Millennial students who are unequivo-cally not their parents. Technology has dramatically transformed students, yet faculty and schools have changed little in response.

Why are the vast majority of classrooms still designed as "boxes" with teachers positioned in front of the room facing rows of students sitting in desks employing their parents' tools of pens and paper? Why are today's learning spaces still designed using the students-per-square-foot formula long ago created to support a factory-model agenda? Why are measurements of learning solely focused on the classroom experience?

Surely the goal must be to bridge the digital divide—to understand the ways students use technology, integrate those uses into teaching and learning, and create the modern classroom based on that new pedagogy.

LINKING PEDAGOGY AND SPACE
TO CREATE NEW ENVIRONMENTS

Creating great learning environments to support 21st century skills would be simpler if every school, institution, classroom, teacher and student were all the same, but they are not. Education is an extremely diverse field and there is no single approach to creating optimal classrooms or campuses.

Compounding the complexity is the expectation that good education be dynamic. In response, classrooms can be in constant flux to reflect the pace of change and interchange. Designing flexibility into an education space is therefore crucial.

As mentioned, a technology rich, democratic, more culturally diverse society is among the trends accelerating the call for changes to teaching methodologies and classrooms. Today's students need academic challenges; demand active and engaging learning; seek a supportive campus environment; and desire interaction, enriching experiences, and feedback. They enjoy learning with other students, whether by participating in study groups or working on group projects. Today's students want to collaborate, connect, and create.

Traditional spaces are being transformed into flexible learning environments.

Such end-user needs are shifting the education power—from institution to individual. Yesterday's passive, knowledge-revealed approach must become today's active, knowledge application (seeing, hearing, doing, engaging). In the new pedagogy, monologue is replaced by dialogue and technology supplants textbooks or at the very least, supplements them.

Terminology and objectives are indeed starting to change. The goal of "teaching" is evolving to instead reflect the need to generate "learning." "Instructing" is evolving to "engaging." Lecturing delivered by the "sage on the stage" is giving way to the "guide on the side" whereby active student-learners use technology and teach themselves with the help of a teacher's guidance.

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The more dynamic the pedagogical approach, the greater the need for dynamic space. The less students need the physical limitations of bricks and mortar to learn, the more flexible the facility planning must be. Curriculum must drive planning.

Efforts to initiate active and collaborative learning are often forced into traditional classroom designs. Those efforts are now beginning to transform those traditional spaces into flexible environments that can accommodate both diversity and density. Design changes are being launched in small corners of the country by schools that clearly understand the connection between space, learning, and student success, and are eager to innovate.

•New Tech High Schools throughout the country have re-imagined teaching and learning and the educational environments that support both. Project-based learning, seamless technology and a collaborative culture come together in uniquely designed, wide-open spaces. Few walls, glass walls, and no walls provide very little separation between classrooms and corridors pushing active learning and all-out engagement to new levels. Space designed to support learning opportunities extends throughout the school campus to include lounge areas, cafeterias, and gathering spaces of all sorts and sizes.

Libraries are evolving into learning commons

The classroom footprint is also unique. Typically they are double-sized studios that house a double group of students in a two-teacher, team-taught interdisciplinary class with available breakout spaces. Specialty labs for science, engineering and graphic media are also in the mix, and new technologies drive project-based learning.

•The Monroe Library Learning Commons at Loyola University, New Orleans provides a versatile space where students, faculty, and staff come together to study, learn, teach and socialize.

"We want students to be able to collaborate in groups, create their own spaces, and be inspired by a technology-rich environment," said Mary Lee Sweat, dean of libraries.

Technology-enabled active learning center

Unlike the common library layout with rows of bookshelves, one-person study carrels and standard tables and chairs, the Learning Commons features an open design. Several distinct areas within the Learning Commons include a Porch and Living Room, lounge areas with comfortable seating, tables and marker boards; Common Grounds Café, which serves coffee and other beverages; the Snowflake Computer Area; and group study rooms.

Social learning environments facilitate discussions with colleagues and collaborative teamwork

• MIT's technology-enabled active learning (TEAL) merges lecture, simulation, and hands-on desktop experiments in one classroom to create rich, collaborative learning experiences. It is based on the theory that scientists and engineers do not work solely in isolation, but instead work both in groups and alone on the path to discovery. Social interactions are critical to success, as are discussions with colleagues and collaborative teamwork.

Students work in groups of 3 with 9 students in all around a table. Students study together, ask each other questions, help one another and critique group home-work/lab write-ups. They teach one another and in the process, learn more.

• The Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP) at North Carolina State University successfully addresses large enrollment classes using a studio environment. The approach involves active learning in a classroom of 100 or more students with hands-on activities, simulations or Q&A. Highly collaborative, students work together on assignments, share laptops, and become deeply involved with the material they are studying.

Social interaction between students and teachers is the active ingredient that fuels success. Large round tables facilitate group interactions with white boards stationed around the room and/or for each group's use. Students use networked laptop computers and teachers roam the room, answering questions and monitoring progress. A teacher's station is near the center of the room, but impromptu lectures and dialogue occur anywhere among the students.

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•Duke University's new School of Medicine Learning Center is innovatively aligning design with learning principles. To develop its new facility, the school looked beyond formulas for instructional hours and cost of space to instead plan its dynamic new space based on studies by the National Training Laboratories (NTL) that demonstrate how learning environments affect retention.

Those studies show that the traditional lecture format produces only a five percent learning retention rate. In contrast, giving students the opportunity to practice-by-doing results in a 75 percent retention rate. Even better, using a team-based, experiential approach in teaching can result in a 90 percent retention rate.

As a result, the new facility expected to open in November 2012 redefines cost-effectiveness based on how effective an environment is on retention (student learning). As such, it combines three key instructional models in its space—team-based learning (TBL) lecture halls, teaching labs, and small group rooms to support overall team-based learning.

The TBL lecture hall is a departure from the traditional lecture hall in that it provides for breakout space within the room. Two rows of seats on each tier have tables between them allowing students to move from listening to lectures to engaging in small group discussions with just a swivel of their seats.

Using the cost-per-retention formula, the school will realize more value for its investment—the TBL lecture hall reflects a cost of just $10,292 versus a lecture hall with a cost-per-retention unit of $128,750.

Duke's innovative approach clearly underscores the importance of defining learning spaces in a much broader context—beyond the traditional student-per-square-foot evaluation—thereby gaining not only cost effectiveness, but establishing the true value of a learning space while ensuring the ultimate teaching objective, that is, educated students.

FROM REVITALIZING TO REDEFINING THE LEARNING ENVIRONMENT

Redesigning for today's classroom often requires reconfiguring walls as well as furnishings and making those dynamic spaces readily available for multiple-use. New designs driven by new pedagogy can include a variety of spaces for

individual work, small group work, large group work, lectures, presentations, breakouts and interactions with faculty.

Yet truly optimal learning environments must be more than revamped classrooms that support laptops and promote collaboration with other students. To truly shift the educational paradigm, learning spaces must also reflect a network of connected places outside the classroom. Where learning can flow from one space to the next and the next, and a sense of community is fostered.

Mobile devices and wireless technology allow learning to occur anywhere, any time. Therefore an entire school or campus can be considered a learning space and designed accordingly. By recognizing that any space is a potential learning space, the right planning and design will allow students to seize learning moments or even foster them. The right design will support technology tools and promote spontaneous and unencumbered student-to-student and student-to-faculty interaction well outside the traditional classroom.

Space design should encourage "socially catalytic" interactivity

The right design will create a community of learning in every square foot and leverage space for "socially catalytic" interactions , areas where students and faculty can meet informally or where students can work together on projects.

•Commons areas have historically served as a place for students to gather for conversation and social activities. Now when students meet in a commons area, they're likely to bring laptops, smart phones, and other electronic devices that allow them to socialize and pursue academics at the same

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time. Mobility and ease of furniture reconfiguration is critical for leveraging the learning opportunities that common spaces afford. Doing so will allow for a multitude of functions—group projects, independent study space, areas for presentation preparation and practice.

• In corridors and along walkways, students and faculty spontaneously continue classroom dialogue and explore ideas. Adding chairs, tables and whiteboards in such "neutral" spaces promotes the opportunity for continued student engagement. It also gives teachers the flexibility of using corridors as breakout spaces during class time instruction.

• Areas directly outside academic offices are also prime for continued collaborative learning opportunities. Students are encouraged to work on projects with the addition of tables, chairs and whiteboards. Interaction with faculty encourages students' independent involvement in learning.

• Informal nooks, monumental stairwells, landings, and off-elevator spaces all serve as potential learning spaces. Planning and maintaining areas where students casually bump into one another can support impromptu student engagement and further foster a community of learning. Soft seating that feels comfortable and homey can be an invitation to relax and keep learning.

Schools and institutions are beginning to challenge the status quo, recognizing the role space design both in and outside the classroom can play in achieving educational goals. Yet we must also challenge how we measure successful design.

CHANGING MEASUREMENTS, PARAMETERS, MINDSETS - TIME TO PARADIGM!

New design principles in education require a completely revised approach to reconfiguring learning spaces and measuring success. But how do we drive toward a learning-per-square-foot mindset and replace outdated students-per-square-foot standards so entrenched in educational space planning yet seemingly so contrary to the academic excellence that's needed in the 21st century?

The actual solutions for replacing irrelevant design formulas will certainly be as varied as the students, teachers and curriculum across the country. Yet the formulas for creating optimal learning spaces will all benefit given the following considerations:

Plan and design holistically, incorporating informal learning spaces. Classrooms are not the only areas that qualify as "learning" spaces. Non-classroom areas can and should be part of the education equation. Facilities and institutions must maximize educational opportunities by considering every square foot on campus as a potential learning space, and explore ways to connect each area of learning.

Enable and support technology. Technology has transformed our world and shaped our students. 24/7 access to technology is how the digital generation learns. It now must also be leveraged when faculty teach.

Deliver versatility. Mobility, flexibility, and adaptability are reoccurring themes behind the evolution in space design. From furniture to walls, the right choices easily move beyond the classroom and beyond today to ensure future adaptation and long-term investment value.

Advance environmental objectives. Schools want to make wise interior product selections based on sustainable materials, manufacturing processes and indoor air quality. The desire to go green enters into the planning equation, as much for overall environmental reasons as for ensuring safe and healthy campus environments.

Redefine success. Today, reality suggests that success is defined by student metrics. So long as stakeholders such as administrators, teachers, facility planners, and students acknowledge the current sea change in the educational environment, together they can commit to developing a new approach to space planning and design that is supportive of student success, however they choose to define it. Consideration for "learning per square foot" approach that includes both formal and informal engagement may be a good first step.

In the end, every project involving space should be considered an opportunity to create a learning-centered environment. Teachers must be willing to explore and adopt new concepts in education. Academic leaders must leverage educational trends to transform their schools, develop their faculty, and ensure their students' success. Students must share their insights into the ways they learn and what constitutes ideal learning environments. And architects and designers must be prepared to deliver innovative space solutions that fuel a 21st century learning process.

By adopting a holistic approach that includes students, teachers, methods, technology and space, our educational system can create an innovative path forward. The time to paradigm is now.

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