THE LEARNING ENVIRONMENT **SWEET SPOT**

The Learning Environment Sweet Spot:

Elevating the Education Paradigm

Amy Kiefer
KI Vice President, Education Markets

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SUMMARY

These are remarkable times for education.

In the midst of the Information Age, our country's learning systems, concepts, and their delivery are on the cusp of truly radical transformation. It's a movement driven in part by a convergence of technology and dramatically different generational profiles. The result is an industry beginning to explore opportunities that will wholly redefine teaching and learning.

The philosophies of pedagogy and beliefs about what disciplines should be taught are beginning to shift. Instructional practices and processes are likewise beginning to evolve. Classrooms are "flipping," and the responsibility and roles between teacher and student are reversing.

Building and classroom designers are also exploring change, experimenting with spaces to create true departures from timeworn Industrial Age designs. Familiar, little rows of desks, along with big, musty libraries designed to house book collections, and conventional stair-stepped lecture halls are beginning to give way to wholesale knowledge spaces tailored to educators, their students, and to 21st century learning principles.

Remarkable times indeed. Although we have yet to reach a tipping point, most would agree there's no turning back. Education will never again be what it once was and the possibilities for what it can be in the future are exciting, extraordinary, and populated with questions about ideal learning spaces that beg to be answered today.

How can today's educational systems define and design better learning environments (layouts, furnishings, space utilization)? What does the classroom or the campus of the future look like? Is there a single best formula for transforming traditional classrooms of yesterday into the interactive classrooms of tomorrow?

This paper explores the many factors surrounding the prevailing quest to find the one, best vision for creating optimized learning spaces. In doing so, it establishes that ***there is no one best vision.*** There are far too many dynamics that must be managed when creating a learning environment to suggest a single classroom ideal or one singularly "right" learning space for the future.

Instead, key stakeholders must acknowledge learning trends, recognize the relationship between pedagogy and physical space, and balance The Three Principal Spheres for Learning Environments as explained herein to develop their own unique, customized, and optimized "sweet spot" for learning spaces.

INTRODUCTION

Google the question, "What does the classroom of the future look like?" and millions of predictions pop up. It seems the march of digitalization and the proliferation of devices is firing up imaginations. Some analysts are even predicting the entire automation of the national educational system. (Absurd? It wasn't long ago that automation happened to manufacturing.)

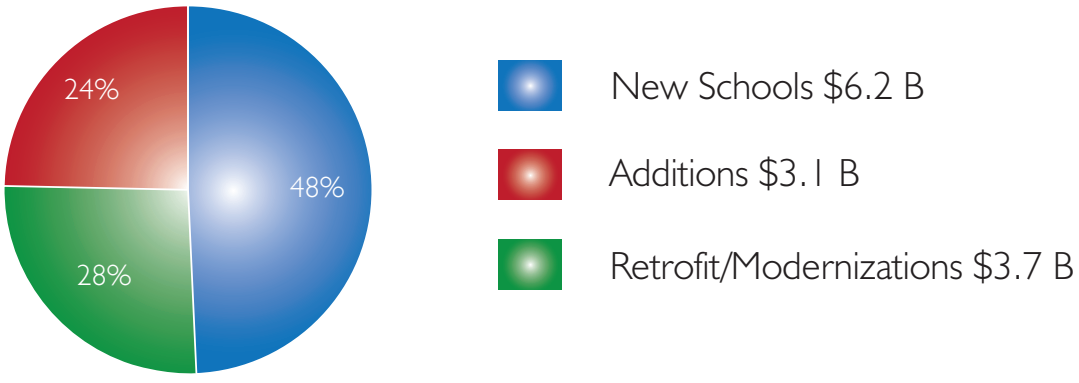
Yet this same question is echoed in the marketplace—what exactly should the classroom of the future look like? How should it be designed? What kinds of furnishings and technologies should it support? What about the rest of campuses, buildings, and environments? These are valid questions that require reliable answers in order to support high-return investment decisions.

According to the World Bank, educating all children worldwide will require the construction of 10 million new classrooms in more than 100 countries by 2015.[1] Moreover, scores of existing classrooms are currently in dire need of repair and renovation, with 76% of U.S. schools reporting a need for funding in order to address repairs and renovation.[2]

Here in the U.S., school districts (primary and secondary) spent more than $13.0 billion on construction projects in 2012 including $6.2 billion on new schools. The balance of the total spent was $3.1 billion on additions and $3.7 billion on retrofit and modernization.[3] Of those additions to existing schools, classrooms were the top facilities added at every school level – they made up 69.1% of elementary school projects, 49.2% of those at middle/junior high schools, and 42.9% of high school additions.[4]

PRIMARY/SECONDARY SCHOOLS

2012 Construction Expenditures in Billions of Dollars

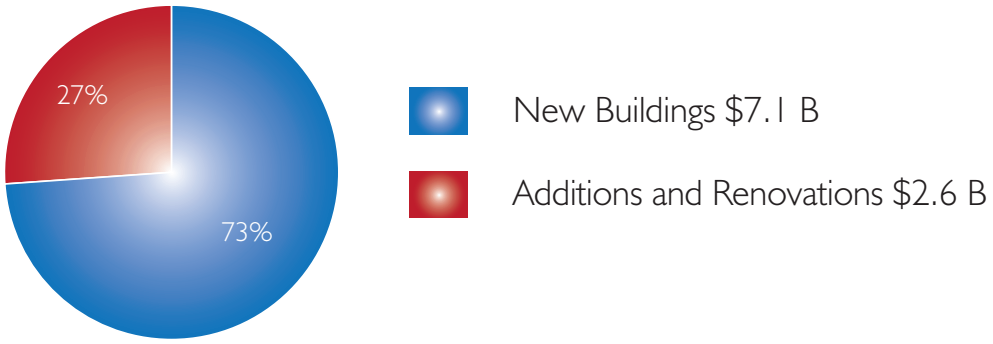


While $13 billion seems like a hefty number, as does the $11.7 billion that is estimated to be spent on 2013 school construction projects, the reality reflects a decline in construction investments. From 2000 through 2008, school construction averaged more than $20 billion annually.[5] Clearly, modernization and improvements are being deferred.

On post-secondary and higher-education campuses, there's also a continuing demand to invest in spaces. In 2012, colleges and universities throughout the U.S. put more than $9.7 billion worth of construction in place, with $7.1 billion going to entirely new buildings.[6] The balance went to additions and renovations of existing spaces.

POST-SECONDARY and HIGHER EDUCATION

2012 Construction Expenditures in Billions of Dollars



With average costs for constructing a new high school estimated at $214 per square foot, and the median cost per square foot to build a new campus academic building at $398,[7] getting space planning and classroom design right is critical. Compounding the challenge to get it right is the knowledge that school buildings built today will still be in existence 40 years from now (often still leveraging the same furnishings from 40 years prior).

How do decision makers exercise the foresight to build a classroom that will continue to serve the educational needs of the future? How can educational systems make the most prudent investments? How can they avoid the common mistake of simply layering new technologies into spaces that will still look and function like standard, inadequate classrooms?

As architects, designers, facility managers and educators look for the single best way to design a classroom of the future, one thing is certain: ***they won't find it.*** Market exploration confirms that there exists no single classroom ideal or learning space of the future.

Instead, educational systems must take their cues from a set of variables and trends that greatly influence and determine the classroom possibilities most suitable for their objectives. Thus by exploring The Three Principal Spheres for Learning Environments - who's learning and how, who's teaching and with what tools, what's being taught and why - decision makers will be better able to hone in on their unique "sweet spot" for optimizing their learning spaces.

WHO IS LEARNING AND HOW

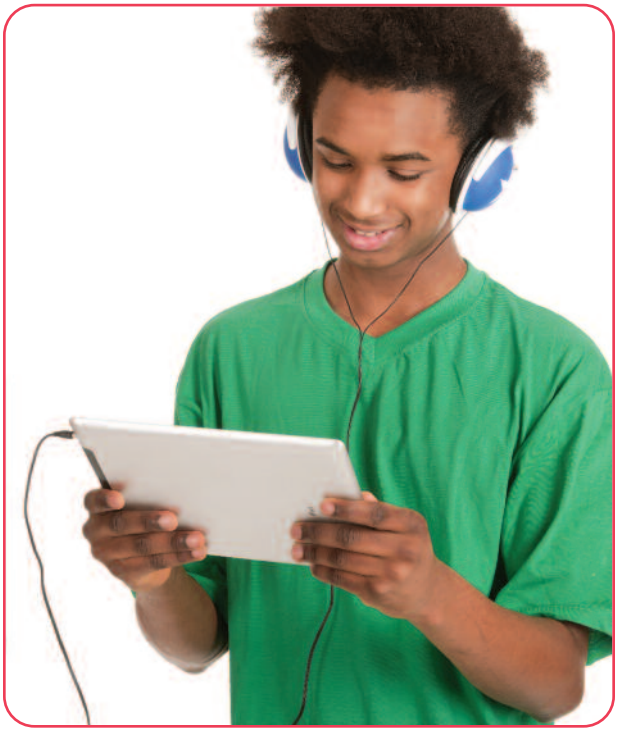
Understanding Demographics and Generational Impacts

As our nation seeks to educate the next generation of students in today's system, it's imprudent to talk about developing those future spaces without first discussing whom they are being transformed for. Decision makers must recognize at the outset that general population changes will greatly impact the delivery of education.

Case in point, primary school systems and higher learning campuses have already had to manage (or at least consider managing) the digital expectations of the Millennials, those students born between 1982-1995. (See KI white paper, Learning Per Square Foot: Shifting the Education Paradigm.)

Like the Millennials, every generation of students is characterized by different experiences that shape their perspectives and behaviors. The traits and expectations of the newest and upcoming school-age generation—the 23 million "Boomlets" or Gen Z, also known as iGen—are of particular concern for those striving to develop effective classroom designs.

Born into a digital world between the mid-1990s and 2010, these "Digital Natives" are already proficient with and dependent on technology. It is a critical part of how they interact, play, and learn.[8] They are the first to grow up in a world where the Internet has always been available and accessible. In fact, the web has already impacted the learning preferences of Gen Z.



According to a 2010 study,[9] 43% of today's teens prefer a digital approach to education and find it easiest to learn from the Internet. Even more of them, 46% believe that virtual worlds will one day be used regularly in schools. Still, 38% have not eschewed books altogether but enjoy a combination of print and online learning.

Other Gen Z behaviors and traits that affect their learning styles include the following:

- They are avid multitaskers.
- They value constant connectivity through the Internet, instant/text messaging, mobile phones, and social networking sites.
- They adapt quickly to the newest technologies.
- They rely heavily on the Internet to complete homework assignments.
- They are more adept at processing visual information and have better hand-eye coordination.
- They are flexible and expect flexibility from institutions in return.

Therefore, the first means for getting planning right: Know your future students in order to know your future classroom designs.

Clearly, educators will have to address this generation's heightened technical expectations, tremendous media consumption, and hyper-connectivity. Classroom designs will likely demand the need to accommodate more interactive devices, more collaborative and online projects, more visual forms of learning, and more emphasis on problem solving versus rote memorization.[10] Testing and future means of assessment will also need to be addressed.

Perhaps even more daunting will be the challenge of educating the succeeding group of children being called Generation Alpha. Born after 2010 and raised by Generation X and Y, these children will be far digitally superior and well informed, and even more technology focused. They are expected to be the largest generation to date. It is further predicted that they will start school earlier and stay longer.[11] The time to understand 'the student' and prepare for their learning success is now.

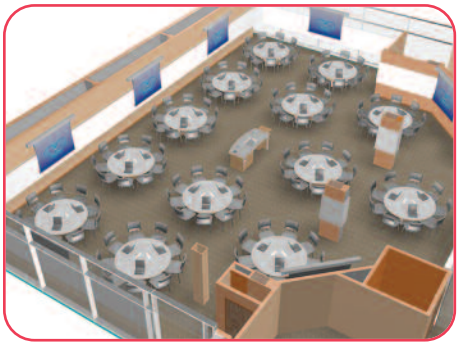
WHO IS TEACHING AND HOW

Acknowledging Pedagogy

Classroom and learning space design is never ideal unless it enhances the overall teaching and learning process. As key stakeholders, teachers must be involved in designing and developing learning space to meet student needs and support the style of pedagogy.

Pedagogical innovation is beginning to occur and much of it requires space that supports student engagement while encouraging exploration by both teachers and pupils. The biggest "flip" in pedagogy involves the shifting of teachers' roles from that of instructors to becoming spontaneous facilitators.

This trend is evident in a variety of active learning classrooms (ALC) that have emerged over the last two decades. Among the focus of such engaged-learning approaches are an emphasis on interaction and discussion; a pre-requisite for pre-work by students who are then required to come to class prepared; and hands-on experience and problem-solving exercises. All are factors that must be supported with appropriate and adequate learning spaces.



Notable ALC examples include SCALE UP (Student-Centered Active Learning Environment for Undergraduate Programs) originating at North Carolina State University, TEAL (Technology Enhanced Active Learning) at MIT, and TILE (Transform, Interact, Learn, Engage) at the University of Iowa. Each example optimizes space with thoughtful, flexible, and nontraditional room designs.

Additionally, a wide range of other new pedagogies are finding acceptance in educational systems today and most certainly will into the future. These are variations on a similar theme whereby students and teachers essentially co-create the learning experience. Among the leading pedagogies are student-centered learning, problem-based learning, mobile learning, and blended or hybrid learning.

Mobile and hybrid curriculum integrate technology to create learning experiences that extend beyond the classroom. Using online tools and virtual instructional models, teachers can leverage technology to tie onsite and online instruction together.

Therein lies a parallel objective for creating classrooms of the future. Simply adding technology into classrooms will not change the dynamics between students and teachers. Neither will it magically improve learning. Instead, technology in (or out of) the classroom must be aligned with the pedagogy. And faculty who are authentically engaged in transformative pedagogy should play a considerable role in helping to develop future classroom designs as well as defining the technology within.

What Tools are Available: Leveraging Technology

The use of technology in the delivery of instruction is a trend that is here to stay.[14] Instructional computers are available in 97% of U.S. public school classrooms, and two out of three teachers are integrating technology into instruction at least moderately.[15] Yet, the shift toward technology-driven, student-centric pedagogy isn't a comfortable passage for all educators.

Some instructors remain ambivalent about technology, preferring a chalkboard and 60-minute lecture. Whether due to pedagogy philosophy, past technical issues, or inadequate supporting technology solutions, these instructors pose a significant disconnect from the Digital Natives—both the current Millennials and the upcoming GenZ. Gaps in technology understanding or adoption by teachers will prevent them from leveraging technology in ways that could greatly enhance instructional practices, effectively engage students, and improve learning outcomes. Faculty comfort and confidence in technology (and what it can deliver) are critical and crucial components to optimizing the success of learning spaces.

Other rapidly emerging technology trends include less reliance on paper instructional materials (workbooks and paper are beginning to disappear), and the greater use of handheld learning devices (smart phones, iPads, tablets and MP3 players).[16]

There's also a dramatic increase in the number of virtual learning experiences, both distance courses and fully online schools. More instruction can be delivered over closed-circuit television and the Internet than ever before, and virtual learning is growing at an estimated rate of over 20% annually.[17]

Tools that support blended learning are abundant, of high quality, and free for the taking: most notably videos from Khan Academy, tutorials from Sophia, and online courses from edX (the non-profit founded by Harvard and MIT) and its affiliated universities plus courses from Coursera® (partnering with some of the world's top universities and organizations to offer free online courses).

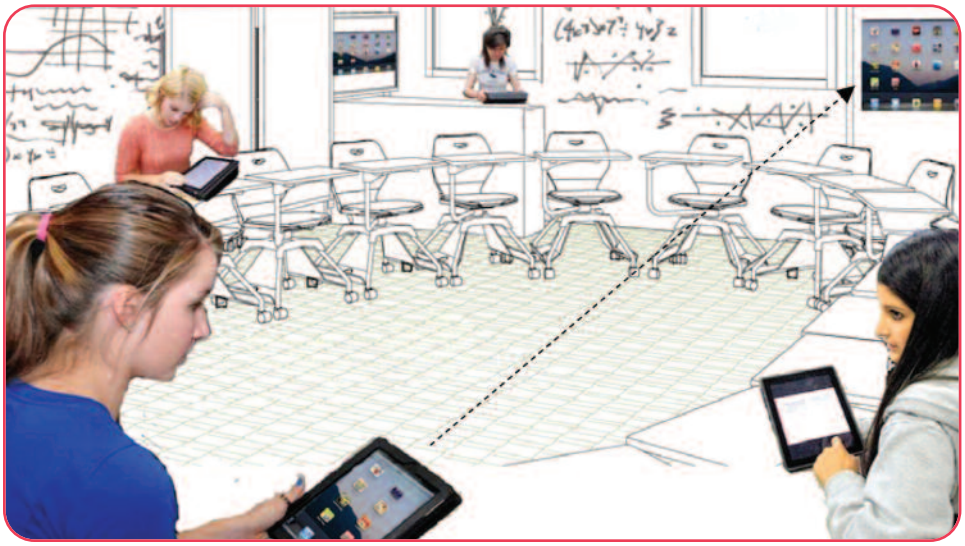
Additionally, the U.S. Department of Education has a vision for transforming America's education by encouraging the use of modern technology to power up the core functions of learning and teaching. Its introduction of a national education technology plan calls for applying the technologies used in our daily personal and professional lives to our entire education system so as to improve student learning.[18]

The need for technology rich learning environments is certain. Transforming the traditional classroom requires considerable study to ensure that educational instruction driven by technology can be effectively accommodated onsite and online.

The key to successful planning and design with regard to technology is providing the best balance of flexibility and other technical needs, which may also lead to select fixed elements. Planning with a line of sight toward the future, despite not having a technology crystal ball is important. In consideration for the next 20 to 30 years, the space will not only be better positioned to support emerging technology and technology-based pedagogies into the future, but will effectively drive and deploy student and faculty success.

A Vision for Engaged Learning 2012

Council of Educational Facility Planners International (CEFPI) Innovative Classrooms of Today project entry. Design by LAVALLEE|BRENSINGER Architects, Furniture by KI, Technology by ProAVSystems[20].

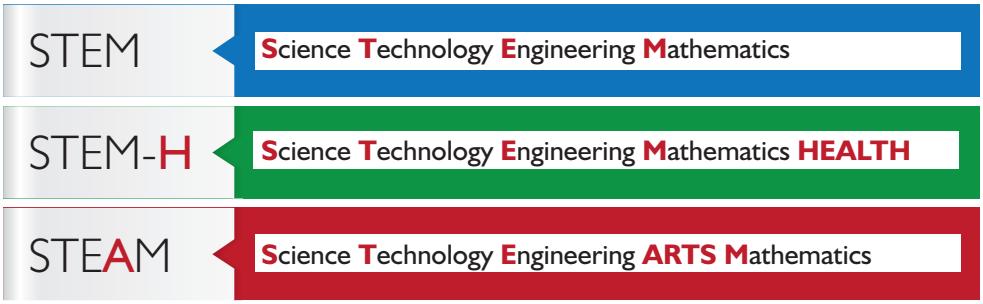


WHAT IS BEING TAUGHT

Recognizing Subject Matter and Disciplines

The ideal classroom design will also vary greatly depending on the subject being taught, as different disciplines require different space needs. Therefore, curricular planning must weigh heavily on future classroom plans.

Currently, instructional time in the U.S. continues to be allocated to core subjects particularly those in STEM fields (science, technology, engineering, and mathematics). This emphasis will persist for the foreseeable future as U.S. businesses continue to voice concerns over the lack of supply and availability of STEM workers. Indeed, STEM occupations are projected to grow by 17% between 2008 and 2018,[12] and a shortage of 230,000 STEM workers has been forecasted by that same year.[13]



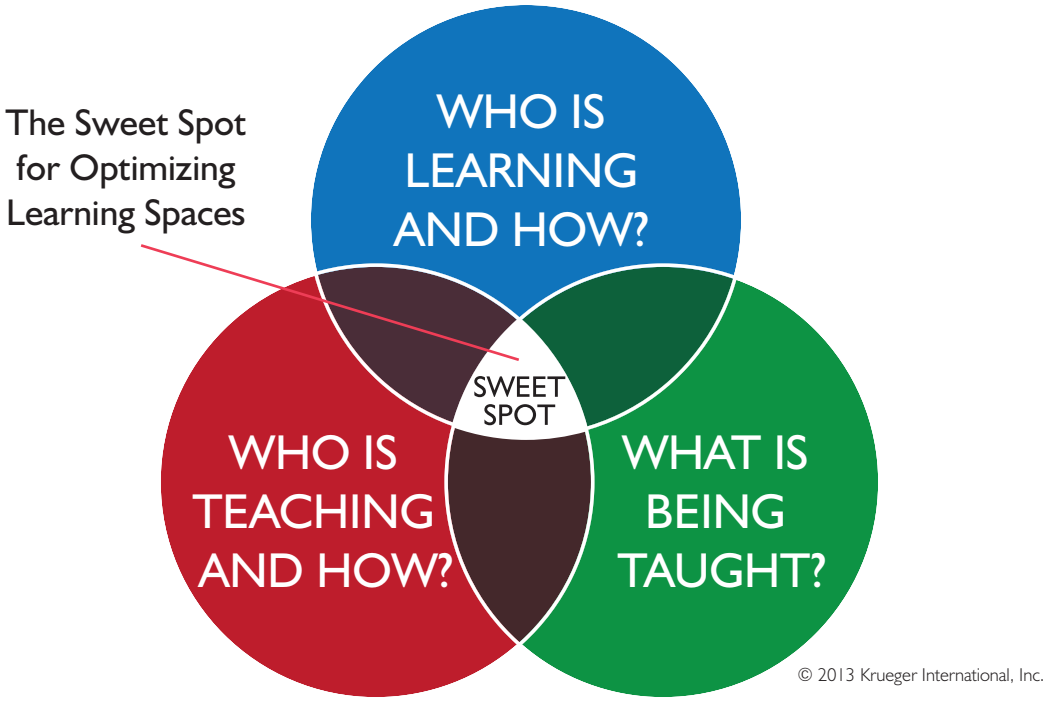
Given that STEM is central to future job demand, today's curriculum and related learning space must adapt to achieve success within these areas. Moreover, public conversation has advocated two additional areas of focus. As the nation scurries to fill an acutely insufficient health-worker pipeline, broadening the intent of the STEM curriculum to include health sciences appears likely (STEM-H). (Nowhere is the shortage greater than in health-related disciplines.) The second area is the arts, with a move toward the corresponding addition of literature, languages, history, and sociology to the mix (or STEAM), suggesting that the arts foster critical-thinking skills.

Therefore, future classroom designs that support STEM+H/STEAM subjects will most certainly require the room to facilitate problem solving, enable project demonstration, as well as affording multiple work surfaces to inspire dynamic exchanges (often floor-to-ceiling white boards). Space that easily reconfigures between lecture and lab work is likely to be an important feature as well.

However, as STEM subjects are interwoven with other modes of learning and disciplines, ideal classrooms will need to be adaptable to accommodate multiple subjects and activities. Future space design must provide the flexibility to support various size groups, multiple modalities, and interdisciplinary learning.

On the whole, when we seek to design optimized learning spaces, we must consider and understand the future direction of subject matter and the shape of disciplines to be delivered.

THE THREE PRINCIPAL SPHERES FOR LEARNING ENVIRONMENTS



Conclusion: Getting to the Sweet Spot

The opportunities to reshape the future of education are extraordinary and urgent. Thinking differently in terms of the future of classroom design and overall learning spaces must become part of long-range planning today. Hopefully, The Three Principal Spheres for Learning Environments will ignite additional thought and inspiration for future learning success.

Additionally, seeking and validating solutions based on research is a prudent place to start. Certainly "evidence-based" research on good classroom design has been at the forefront of exploration and insight for many years. However, statistically sound, validated, and sustained quantitative research is difficult to execute given the multifaceted dynamics at play within the learning environment.

The significant challenge is controlling the variables. For instance, at a minimum, students, faculty, and space are dynamic; controlling for a reasonable duration (from semester-to-semester or class-to-class) is nearly impossible, thus negating the ability to minimize or reduce variables (eliminating them is clearly out of the question).

The ultimate goal of a control in experimental comparison within the research exploration becomes challenging at best. Yet research that can uncover the correlation of learning space and its optimization for student success is necessary and needed. This, combined with alternate research methodologies, will allow the industry to advance meaningful classroom-design insights and successful capabilities. This is the kind of research KI recently conducted in collaboration with the University of North Carolina. (See Robust Research sidebar on page 14.)

In the meantime, planning, while not a new tool, remains critical for creating high-performance learning environments for the future. Educators, facilities managers, architects, and designers must explore their own unique variables in order to optimize the learning space and build it around new learning paradigms that are suitable to their circumstances.

Although a great deal of change and optimization is warranted, there cannot be a "one-solution-fits-all." There exists no single best solution and any search for a single design will be futile. Differentiated instruction, differentiated subjects, and differentiated generations of students make standardization unattainable.

Therefore to succeed, decision makers must understand the dynamics at play in learning environments and strive to enhance them. They should ensure spaces and design principles are well-aligned with evolving demographics, pedagogy, and technology. Each environment must be intentionally designed to enhance and support each model for teaching and learning.

The learning space leader (commonly the professor or faculty member) remains a critical element to classroom success. They are often not afforded the optimal degree of freedom to drive toward their preferred or optimized pedagogy, due to class sizes, space "realities" (i.e., daylight, shape of room, furniture and its related flexibility, etc.), availability of technology, or other teaching tools. And yet, conversations about pedagogy must serve as the starting point for optimum design.

Students are now better able to influence their education. Therefore considerations must be made to accommodate their preferred learning styles in future classrooms. Their ownership of learning may be at an all-time high, moving even higher given the changes in pedagogy toward greater project-based, application-filled discussions and dialogue. Future classroom design will need to respond to more personalized learning experiences.

Technology remains a wild card, and decision makers will need to address the quality of engagement; that is, determine how users plan to leverage and interact with the technology to which they have access.

Together, architects, designers, facilities managers, educators and students must partner to address the above dynamics, including the consequences and importance of trends. Using deliberate and structured processes, we can identify the varying dynamics that can help shape successful classroom designs for our community's future.

Together we must:

- Work to simplify the complex without diluting options. Versatility is an ideal objective.
- Understand the dynamics and enhance them. Recognize, however, that those dynamics cannot be controlled.
- Map out potential concepts, ideas, and requirements by working with key stakeholders.
- Optimize. Observe. Rework. Improve. And do it all over again.

By following this approach, educational communities will reach their own conclusions about how to transform physical space in response. That is how each community will find its own "sweet spot" for learning success.

Robust Research for an Optimized Learning Space

In the spring of 2012, a study was performed to determine the impact on an interactive classroom design using mobile, adaptable Learn2® chairs. UNC faculty members used instructional methods that promote active learning and student interaction in their classrooms. The ease with which furniture can be reconfigured during a standard class session is important to supporting the pedagogy.

In the study, students in four courses being taught in the same room used traditional tablet-arm chairs for the first half of the semester, and then used the Learn2 chairs during the second half of the semester. They were asked to complete two surveys, one before the Learn2 chairs were brought in and another at the end of the semester. To provide additional control for the study, students enrolled in similar courses in an adjacent classroom using traditional chairs also completed mid-term and end-of-semester surveys.

The result was statistically sound, controlled research that clearly supported the benefits of Learn2 chairs over traditional chairs to enhance interactive learning.[19]

[1] 2009 Open Architecture Challenge, openarchitecturenetwork.org.

[2] National Center for Education Statistics.

[3] 18th Annual Construction Report, School Planning & Management, February 2013.

[4] Ibid.

[5] Ibid.

[6] 2013 College Construction Report, College Planning & Management, February 2013.

[7] 18th Annual Construction Report, School Planning & Management, February 2013.

[8] *"Consumers of Tomorrow, Insights and Observations About Generation Z"* Grail Research, November 2011.

[9] Generation Z Reveal Expectations for a Digital Future in Global Study, Habbo Hotel, June 14, 2010.

[10] 8 Important Education Trends in Generation Z, www.bestcollegesonline.com, August 16, 2011.

[11] McCrindle, M., *The ABC of XYZ: Understanding the Global Generations*, November, 2009.

[12] STEM: Good Jobs Now and For the Future, U.S. Department of Commerce, July 14, 2011.

[13] Partnership for a New American Economy and Partnership for New York City, "Not Coming to America," May 2012.

[14] "Ten Educational Trends Shaping School Planning and Design," Kenneth R. Stevenson, Ed.D., National Clearinghouse for Educational Facilities, September 2002.

[15] Gray, L. & Lewis, L., (2009). Educational technology in public school districts: Fall 2008.

[16] Johnson, L., Smith, R., Levine, A., and Haywood, K., (2010). 2010 Horizon Report: K-12 Edition. Austin, Texas: The New Media Consortium.

[17] Watson, J., Ryan, J., & Wicks, M. (2009). Keeping pace with K-12 online learning: An annual review of state-level policy and practice.

[18] Transforming American Education: Learning Powered by Technology, National Education Technology Plan 2010, U.S. Department of Education, Office of Educational Technology, November 2010.

[19] Interactive classroom design using experimental tablet arm desks (201 Dey Hall), Spring 2012 Pilot, Bob Henshaw, Andrea Reubens, University of North Carolina, August 2012.

[20] Project entry and competition finalist at the 2012 World Congress on Educational Environments, hosted by CEFPI in San Antonio, TX, September 22-24. 2012 Council of Educational Facility Planners International (CEFPI) Innovative Classrooms of Today. Design by LAVALLEE|BRENSINGER Architects, Manchester, NH. Technology by Pro AV Systems, Chelmsford, MA. Furniture by KI, Green Bay, WI.

About Amy Kiefer

Amy Kiefer is Vice President of Education Markets for KI, leading both the Higher Education and K-12 strategic business units. Since joining KI in 2010, Amy has been instrumental in helping to grow market share and record earnings. Moreover, Amy played a pivotal role in the development and launch of KI's innovative student "learning station", Learn2®, which the industry recognized with a Best of Neocon Gold Award in 2011. She is a respected industry consultant who continues to focus on shifting the educational paradigm and driving it forward through various industry channels, as well as the KI Educational Advisory Board.

Amy previously served as a business and marketing executive for Appleton papers and held management positions at Kimberly-Clark. She is experienced in business strategy, growth identification, change management, brand integration, global B2B and B2C business managements, market insight, product development, project management, and public speaking.

Amy holds a bachelor's degree from the University of Wisconsin-Madison and an MBA from Emory-Goizueta School of Business.

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