RECONSIDERING THE LEARNING ENVIRONMENT

TRANSFORMING CITY TECH'S CLASSROOMS THROUGH THE LENS OF GENERAL EDUCATION

BUILDINGS AND GROUNDS COMMITTEE COLLEGE COUNCIL SEPT. 2016

Buildings & Grounds

Committee, College Council

Committee's Task:

Excerpt from Governance Plan (https://openlab.citytech.cuny.edu/collegecouncil/files/2013/08/governance_plan-NYCCT.pdf)

Article V Section D:

7) After the last council meeting of the academic year and before the organizational meeting for the upcoming year each committee shall submit a written summary of committee activities to the council secretary. These reports will be forwarded to the chair of the committee on committees who will give it to the chair of the committee for the following academic year.

12) Buildings and Grounds Committee

This committee shall be responsible for producing evaluations and making recommendations to the council concerning the condition, improvements and safety of the college proper and its environs. This committee shall be expected to provide liaison between the faculty and the office of the vice president for administration and finance. To further this goal, the buildings and grounds committee shall be represented on all college-wide committees dealing with the planning and use of the physical plant. Each academic year it shall produce an evaluative report on at least one important area of its purview and submit this written report to college council.

Buildings & Grounds

Committee Members 2015-2016

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Introduction

City Tech has a firmly established policy of pragmatically filling General Education (GenEd) classrooms with tablet arm chairs for students to sit facing the front of the room where the professor's equipment is situated (desk, chair, podium, computer technology, and writing surface) for projecting information and learning experiences to the waiting minds of receding students. The need for this arrangement rests on the need of maximizing the seating for City Tech's growing student enrollment, but its continuance without reflection depends on an institutional and historical inertia for pedagogical models of the past and different generations of students than we now have. However, pedagogical research on improving student learning outcomes through reconfigurations of teaching spaces, utilization of innovative classroom furniture, and enhanced environmental conditions of learning spaces point the way forward for all higher education but more specifically for our college, which is itself reconfiguring itself as a leader within CUNY and the region. Simply put, the research on improving classroom spaces demonstrates an improvement in student learning outcomes without any changes to course content or pedagogical techniques. Essentially, improving the learning space will improve student success, which will in turn improve retention rates, graduation rates, and overall student development.

The literature review below discusses recent findings in the field of classroom design. It is organized in three sections: Philosophy, Furniture, and Environment.

literature review

Reconsidering Classroom Design Philosophy

As reported widely in contemporary pedagogical research, Wulsin argues that, "The traditional transference model of education in which a professor delivers information to students, is no longer effective at preparing engaged 21st-century citizens. This model is being replaced by constructivist educational pedagogy that emphasizes the role students play in making connections and developing ideas, solutions, and questions. Already, teachers are creating active learning environments that place students in small work groups to solve problems, create, and discover together" (Wulsin 2). The driving need for this change is, "To prepare students to be effective agents of change in a complex and interconnected world" (Wulsin 6). One of the most effect ways to accomplish this has to do with classroom design: "Well-designed space has the ability to elevate discourse, encourage creativity, and promote collaboration" (Wulsin 2). Considering the needs of City Tech GenEd classrooms, which need to accommodate the pedagogical approaches of many different teaching styles and subject matter, flexibility ensures these things: "Within the classroom walls, learning space should be as flexible as possible, not only because different teachers and classes require different configurations, but because in order to fully engage in constructivist learning, students need to transition between lecture, group study, presentation, discussion, and individual work time" (Wulsin 2). This flexibility for the classroom space mean that, "classrooms should be effective in multiple configurations" (Wulsin 14). Some of the possible, "Classroom configurations include linear (lecture, presentation, video), horizontal (class discussion), cluster (small group discussion and activities), and network (decentralized instruction)" (Wulsin 14). The linear configuration represents the majority of City Tech classroom setups. City Tech classrooms can be reconfigured into other classroom arrangements, but they can only be done so by moving top-heavy tablet arm chairs noisily across the floor, which disturbs neighboring classrooms and offices above, below, and to the sides of the reconfigured classroom during each reconfiguration.

There are a number of university centers and higher education programs involved in planning, testing, and reporting on innovative classroom design for improved student outcomes. Some of these include SCALE-UP (Student-Centered Active Learning Environment for Undergraduate Programs), TEAL (Technology Enhanced Active Learning), The Link (flexible classrooms at Duke University), and ATLAS

(Alliance for Technology, Learning, and Society at UC-Boulder). Another is the Center for the Enhancement of Teaching and Learning (CETL) at the Georgia Institute of Technology (Georgia Tech), which promotes best practices in all aspects of improving student learning outcomes, including those focused on classroom design and environment. Considering the need for better student learning outcomes, they argue for five philosophical principles of good classroom design: 1) "Classrooms should facilitate student engagement," 2) "Classrooms should facilitate student collaboration," 3) "Classrooms should facilitate connections between teachers & students," 4) "Classrooms should incorporate appropriate technology," and 5) "Classrooms should have flexible physical arrangement" (CETL 1). All of these apply equally to "Ramblin' Wrecks from Georgia Tech" as City Tech's students enrolled in GenEd classes.

CETL's philosophy for improved engagement, collaboration, and flexibility is supported by Baepler and Walker's work on active learning classrooms (ALCs), namely "*educational alliances* between students and instructors and among students, *relationships* that help to improve both the student learning experience and the learning outcomes that students achieve" (Baepler and Walker 27). In their study, Baepler and Walker's "focus on alliance is built on the general proposition that the social context in which teaching and learning takes place can affect, either positively or negatively, student academic and developmental outcomes" (Baepler and Walker 28). In addition to finding that the most effective learning involves active participation by students and instructors, they find that, "many aspects of the ALC design promote effective communication and feedback, in particular *proximity, new lines of communication,* the use of appropriate *technology,* and the promotion of *higher quality communication*" (Baepler and Walker 33). With the non-hierarchical structure of an ALC, communication flows in different directions between students and instructor, and among students, which supports more ways of sharing, discovering, and questioning. They describe how "the physical configuration of the ALCs, in particular the round tables, is designed to facilitate [student cooperation on projects and assignments]" (Baepler and Walker 35). While they focus on ALC classroom design centered around a node or round table-focused design, a classroom with furniture supporting reconfiguration and flexibility can be utilized by a City Tech professor wishing to deploy ALC in her pedagogy.

Supporting the concept of space as a key component of student success, the National Learning Infrastructure Initiative (NLII), an Educause Program, argues that

changing ideas about space (physical and virtual), and deepening understanding about how space affects how we learn has led to a fundamental shift in classroom design away from traditional classrooms to learning spaces. They state that, "As a result, the notion of a classroom has expanded and evolved; the space need no longer be defined by 'the class' but by 'learning.' Learning space design as an important consideration for colleges and universities" (NLII 1). They discuss how "designing space is an important institutional activity" that "[conveys] an image of the institution's philosophy about teaching and learning" (NLII 1). Due to the usefulness demanded of buildings (50-100 years), pedagogical trends (10 years), and technology (annual), they assert that, "the stakes are too high to risk settling for inadequate design" (NLII 1). More to the point, they argue that, "Learning, rather than heating systems, lighting controls, or computer projectors, should be at the center of learning space design" (NLII 1). They provide six components to learning space design. First, "the vision for a learning space derives from the underlying learning philosophy of the institution and its programs," and it should include, "A focus on learning," and "the interactive campus" (NLII 2). They identify analysis as the second step: "Before beginning the design of a learning space, several types of analysis and information gathering are recommended," and the areas of analysis include: "Disciplinary needs," "External benchmarking," "Learning modes," "Existing space use," "Gap analysis," and "Curricular reform" (NLII 3-4). The third component is assembling the appropriate team to create the learning space design, and it involves reaching out to all stakeholders and involving advocates who can put the design into practice (NLII 4). The fourth component is the design considerations, which includes, "A number of principles, considerations, and constraints [that] can impact learning space design. Maintaining a balance among these factors, while keeping learning as the primary objective, is a critical role for institutional leaders" (NLII 5). Design considerations include: "Design learning spaces around people," "Support multiple types of learning activities," "Enable connections, inside and outside," "Make space flexible," "Accommodate information technology," "Design for comfort, safety, and functionality," and "Reflect institutional values" (NLII 5-6). The fifth concern is policy considerations, such as the very important need for accessibility. Finally, the sixth component is assessment: "Ongoing assessment of learning spaces results in iterative design and continuous improvement" (NLII 6). The result of good learning space design has the potential to pay tremendous dividends for the institution as a whole: "Good learning space design can support each institution's mission of enabling student learning.

literature review

In fact, the convergence of technology, pedagogy, and space can lead to exciting new models of campus interaction" (NLII 7). With City Tech's evolving mission as a senior college faced with goals of improving student retention and graduation rates, good learning space design seems like an easy way to meet those goals while adapting a design that also reflects City Tech's institutional values.

Reconsidering Classroom Furniture

Considering the already-existing configuration of City Tech's current GenEd classroom space, flexibility can be most easily acquired through new types of furniture that fulfill the current focus on tablet arm chairs while adding new affordances that transform the current transmission classroom designs into dynamic active learning environments.

Steelcase Education, a furniture manufacturer for educational environments, collaborated with academic researchers to test perceptual differences to learning between traditional/transmission pedagogy classrooms and new/active learning pedagogy classrooms through a self-reported assessment by students and faculty they called the Active Learning Post Occupancy Evaluation (AL-POE) tool (Scott-Webber et al. 1). They note that, "The success of any student is influenced by many variables. Academic studies have investigated several of them, from socioeconomic background to internal motivation to the influence of different teaching styles. Still often overlooked or underemphasized is the role of classroom design" (Scott-Webber et al. 1). They go on to say that, "More recently researchers have explored how a learning environment impacts students. The

consensus is that learning spaces have physical, social, and psychological effects" (Scott-Webber et al. 2). Having students and instructors use a traditional classroom or one of Steelcase Education's scenarios (Verb, Node, media:scape, or LearnLab) without any "training from Steelcase on active learning practices. The settings were simply provided for their use as they saw fit" (Scott-Webber et al. 2), they found in the self-reported results that indicate "a highly positive and statistically significant impact of active learning classrooms on student engagement" (Scott-Webber et al. 3). Specifically, they report that the new classroom environments "improved active learning practices and had more positive impact on engagement compared to the old classrooms" (Scott-Webber et al. 3), "the majority of students rated the new classroom better than the old classroom on each of the 12 factors [collaboration, focus, active involvement, opportunity to engage, multiple means, in-class feedback, real-life scenarios, ways of learning best, physical movement, stimulation, comfortable to participate, and enriching experience]," "Overall, active learning practices and the impact of the physical space significantly improved in the new classrooms for both students and faculty," and finally, "The majority of students and faculty reported that the new classrooms contributed to higher engagement, the expectation of better grades, more motivation and more creativity" (Scott-Webber et al. 4). Based on their findings, they suggest, "As a result of the development of the evaluation instrument and this managed research program, decision makers at educational institutions, architects and designers can be assured that investments in solutions intentionally designed to support active learning can create more effective classrooms and higher student engagement" (Scott-Webber et al. 5). However, they also recommend training for faculty to maximize the learning possibilities for students using the new layouts and furnitures.

Bidwell discusses the classroom configurations tested by Steelcase Education and reported by Lennie Scott-Webber, Aileen Strickland, and Laura Ring Kapitula in the white paper annotated below, "How Classroom Design Affects Student Engagement." In addition to illustrating the types of configurations and how they were used at Ball State University and University of Minnesota-Rochester. Gary Pavlechko of Ball State tells Bidwell that, "Never did I realize just how valuable a piece of furniture can be to how one perceives the learning opportunities" (qtd. in Bidwell par. 7). He goes on to say that faculty members in the redesigned classrooms, "[seem to be] getting lost within the learning space," and "They have become so much a part of the learning experience, versus being just the teacher in the process. . . . Direct instruction has been around for a very long period of time, but when we talk

about true learning, most experts will say that in order to understand how to teach effectively, you have to be yourself an effective learner" (qtd. in Bidwell par. 15-16). Bidwell reports that Ball State faculty have to go through a "six-semester professional learning process, which in part involves observing already-trained faculty" (Bidwell par. 17), because they only have a few classrooms currently configured with this new furniture and they want to ensure that those faculty assigned to those classrooms will use its affordances for the benefit of students.

Mirror the studies above, Henshaw and Reubens report in their case study how one simple change--adopting a new desk--achieves modest goals for active learning in a traditional classroom space. The reason behind their modest experiment is true for many institutions including City Tech: "Unfortunately, much of the time that students set aside for learning does and will continue to take place in classrooms that are not schedule for major renovation, and in buildings that were not designed with broader learning goals in mind. As a result, most institutions are left to consider more immediate options for making classroom space suitable for the evidence-based interactive instructional methods that a growing number of faculty members are adopting" (Henshaw and Reubens par. 1). Considering how best to use available dollars for the greatest active learning impact on a traditional classroom, they note, "Some of the most cost-effective solutions are updates on traditional designs" (Henshaw and Reubens par. 7). They settled on the tablet arm chair, which they explain, "is almost ubiquitous in campus classrooms throughout the world. The primary enhancements to the design include the use of casters, more flexible surface work space, and beneath-seat storage options for student book bags and other personal items. None of these represent revolutionary innovations, but together they begin to address a pressing need in the typical college classroom" (Henshaw and Reubens par. 7). For their experiment, they note the availability of The Node by Steelcase, but they partnered with Kreuger International (KI) and campus stakeholders to design a new adjustable, tablet arm chair on castors dubbed the KI Learn2. On using the KI Learn2 tablet arm chairs, students and faculty reported it taking less time to move desks, it generating less noise when moving desks, and it being more comfortable due to the tablet being adjustable and larger than typical tablet arm chairs. Faculty also appreciated being able to move around the room more easily (except when bookbags littered walk spaces as the KI Learn2 has no under-chair storage space), and being able to work more closely with individual or teams of students by simply pulling up a chair or having students bring their chairs

to where the instructor is seated.

Cornell argues that new furniture and classroom arrangements enable the work of education and learning, which in turn, produces graduates ready for a rapidly changing workplace. He argues, “Furniture is both tool and environment,” which until recently supported, “[an] educational system suited [to] the industrial economy” (Cornell 33). He advocates for change, because, “The industrial economy has given way to the knowledge economy” (Cornell 33). This is even more true for our students at City Tech and their future careers. In the knowledge economy, he sees education and work as being closely aligned as a reciprocal cycle of learning and work, which necessitates changes to the tools that make learning and doing possible: “Successful leaders realize they need learning organizations. Successful educators realize they need to prepare a different breed of citizen. In a sense, work needs to become more like school, where learning is an expected part of the job. And conversely, school needs to become more like work, anticipating the kinds of skills and knowledge students will require for a happy and successful life. Work activity, or pedagogy in the case of education, has changed drastically. New methods require new tools and environments. Since furniture is a tool with a specific function, it too must change” (Cornell 34). He frames the need for change in classroom furniture around “user-centered design,” with the users being: “instructors and learners” (Cornell 35). He suggests four, interdependent dimensions for designing the best user-centered furniture: 1) functionality, 2) comfort, safety, and health, 3) usability, and 4) psychological appeal (Cornell 35). Importantly, he notes that some cannot be favored over all, because “Unlike Maslow’s, this is not a hierarchy of needs. The dimensions are not additive but multiplicative--poor performance on one undermines the performance of the overall system. Furniture must address all four simultaneously or the efficacy of the design is in question” (Cornell 35). Furthermore, he reminds us to see the bigger picture: “The best solution is one in which furniture, architecture, and technology are designed to work seamlessly and harmoniously” (Cornell 35). While all dimensions are important, his discussion of functionality adds to the specifics of furniture adaptability: “Furniture should help the instructor and student achieve their goals using the methods and tools of their choice. Furniture should facilitate learning, not just be a place to sit” (Cornell 37). In one case of deploying new furniture selected for maximizing the four dimensions, he and his fellow researchers found, “First, all four aspects of user-centered design were assessed. Second, professors varied significantly in how they taught, supporting the need for flexibility. Third, what was

taught had a strong bearing on how it was taught. . . . Fourth, different display media lend themselves to different uses. All serve a purpose. And finally, the environment had an unpredictable impact on behavior" (Cornell 39). Concluding, he provides these suggestions about how to accommodate the changing pedagogical and learning needs of the contemporary classroom: "To accommodate these changes the physical environment needs to be bigger, more flexible, provide ubiquitous access to technology, promote interaction and a sense of community, enable formal and informal learning, and convey a sense of energy. The environment should be a place people want to be, not a place they have to be. They should be motivated by fun and enjoyment as much as by a desire to learn" (Cornell 41). If these changes are put into place with measurable results, these classrooms become something much more significant in terms of claims about the teaching and learning at the institution: "If properly designed and placed, furniture is more than a place to sit; it can be a strategic asset" (Cornell 42). City Tech's adoption of innovative learning spaces could become a "strategic asset" in multiple ways: a marketing tool for attracting new students and keeping existing students, a distinction for the institution within CUNY and the region as a pedagogical innovator, and a message to donors and partners that City Tech invests in all aspects of improving student success.

Reconsidering Classroom Environments

Van Note Chism argues that greater attention be paid to the classroom environment and its significant role in education. Unequivocally, she states that, "We know too much about how learning occurs to continue to ignore the ways in which learning spaces are planned, constructed, and maintained" (Van Note Chism 5). The hurdle to overcome is, especially considering the classroom design philosophy across much of City Tech's campus, "Were the rooms designed as general issue classrooms, however, the problems with flexibility might still remain, since often so-called all-purpose rooms have fixed seating, a clear front and back that favors teacher talk and projection rather than class participation, and space capacity limitations that prevent movement and reorientation" (Van Note Chism 7). She finds this way forward through changing how we think about classroom design: "In this new constructivist thinking, where teachers serve as facilitators for active student engagement, where learning occurs in many locations, and where power is distributed across actors, learning space needs are seen to be far more dynamic and situational than they were under the transmission model. The new way of thinking about facilitating learning implies the need for small-group meeting spaces, project spaces, spaces

for whole-class dialogue where the students as well as the teacher can be seen and heard, spaces where technology can be accessed easily, spaces for display of ideas and working documents, and spaces that can accommodate movement and noise" (Van Note Chism 10). In particular, the concepts of "dynamic" and "situational" are key to utilizing existing space with new ways of teaching that are more integrative than the transmission model of education.

Dittoe describes several different examples of active learning classrooms and larger environments. He begins, "Designers of educational spaces have always instinctively known that the built environment has profound effect on its occupants" (Dittoe 81). What was once "gut feeling," is now supported by a growing body of theory, practice, and assessment (Dittoe 81). He laments that the classroom, "a place that must by its very essence support and encourage learning," is often, "unfortunately . . . inadequate for this important function" (Dittoe 81). He explores how innovation is taking place at several universities to transition from an instructional paradigm to a learning paradigm where they, "are responsive to the learning paradigm, with the nuances of function, flexibility, and aesthetics necessary to bring the built environment and the educational environment into a harmonious learning relationship" (Dittoe 81). He adds that, "This is a challenge, for this relationship involves not only size and shape and bricks and mortar but also light and color and the essential ambiance that stimulates emotional connections and allows the engagement and inquisitiveness necessary for deep learning" (Dittoe 81). To produce the synergy found in active learning classrooms, he asserts that "Enormous power and creativity can occur when architects are exposed to new ways of thinking about teaching and learning. . . . Similar enhancement occurs when educators learn about the architectural viewpoint and about new developments in space design" (Dittoe 82). Of the spaces he describes, they exhibit differences due to having "different goals," but all of them, "allow creative and spontaneous learning," and "provide responsive built environments that encourage students to take charge, with proper guidance, of their own education" (Dittoe 82). These spaces are "student-centered and empowering," (Dittoe 82). Specifically, he focuses on how they "have affected the educational process in terms of space, furnishings, and equipment, the capacity to be functional and flexible, and provision of appropriate atmosphere and technology sufficient for the educational purpose" (Dittoe 82). Two of his examples stood out for consideration at City Tech in a GenEd course. First, The Prototype Laptop Classroom at Ohio Dominican College provided a challenge to architects to redesign a typically 600 sq.

ft. classroom into an active learning classroom. They brought in stakeholders from all of the departments that would potentially use the classroom for input. Showing the datedness of the article, he describes how the classroom has a 2" false floor hiding electrical and ethernet for the classroom's laptops. The room contains "softly sculpted tables and large padded armchairs," "white boards lining two walls," and "audio visual equipment" in the rear (Dittoe 84-85). Better examples are the Innovative Classrooms at Rensselaer Polytechnic Institute, or what they call, "studio classrooms," used by many disciplines on campus (Dittoe 88). Describing these rooms in detail, he writes, "Studio classrooms at Rensselaer vary from room to room, with two predominant designs--the cluster configuration and the theater-in-the-round configuration. Cluster classrooms situate two to four students at tables around a single workstation. The clusters are arranged in rooms that have normal projection space along one wall but are otherwise flexible with respect to where the instructor is stationed. Often, there is display space all around the room so that students can work at white boards or chalkboards with their peers or the instructor. In these spaces, the instructor can circulate easily while students work, or can stand at one location easily seen and heard by students, who can swing their chairs around to obtain a good sight line" (Dittoe 88-89). Continuing his description, he writes, "In the theater-in-the-round configuration, students work two at a table supporting either one or two computers. The tables are arranged in concentric ovals, often in tiers, with the instructor station at one end and the student chairs on the inside of each oval. Students turn their chairs to the center for whole group discussion or lecture and away from the center for work on the computers. This arrangement prevents students from being distracted by the workstations while they are interacting or listening and affords the instructor a view of the screens from the center when the students are using the computers" (Dittoe 89). In both cases, "the basic design permits teachers to move fluidly from whole-group to small-group activity, from presentation to active engagement" (Dittoe 89). He remarks that, "These spaces reveal the subtle yet profound ways in which surroundings affect activity. It is disturbing to accept the bland classrooms of today as suitable for the most important of human endeavors--learning" (Dittoe 90). In addition to considerations of filling existing spaces with new equipment and furniture, Dittoe's observations point to the fundamental need for purpose-designed and built spaces for learning. Of course, these spaces should be dynamic and flexible, but they need to thought out, assessed, and learned from for improved learning space utilization in the future. One way to accomplish this at City Tech would be to design, build,

and test a small number of GenEd classroom spaces. Knowledge gained from these experiments could be expanded to other classrooms when the need and funding arise for classroom remodeling in City Tech's campus buildings.

Should experimentation with innovative classroom design be undertaken at City Tech, Barrett et al. provide insights for such research on these classroom spaces and a tested experimental model that attempts to understand "the complex problem" of "the holistic impact of built spaces on people 'in the wild'" (Barrett et al. 678). This model is "an Environment-Human-Performance (E-H-P) model that allowed the measurement, and so assessment, of built spaces and their human impacts" (Barrett et al. 679). This model was designed by considering "the hypothesis that the characteristics of the brain's functioning in synthesising sensory inputs highlights the importance of three broad design principles concerning our environment, namely: naturalness, indivdualisation and the appropriate level of stimulation. In this case, these relate, respectively, to: our basic animal demands, the needs of pupils in particular and the implications of the school-learning situation" (Barrett et al. 679-680). Of the classrooms studied, "It should be remembered that the spaces have been assessed in functional terms, focusing entirely on the impact of the differences between spaces on the academic performance of the pupils. In this context, it can be seen that parameters to do with the design principle of 'individualisation' are prominent" (Barrett et al. 688). Some of the most notable findings of environmental factors that support student learning that are addressable by reconfiguration of existing spaces include: natural light, "Classroom has high quality and quantity of electrical lightings," "The space adjacent to the window is clear without obstruction," "Classroom has a high-quality and purpose-designed Furniture Fixture & Equipment (FF&E)," "Interesting (shape and colour) and ergonomic tables and chairs," "More zones can allow varied learning activities at the same time," "The teacher can easily change the space configuration," "With regard to the display and decoration, classroom needs to be designed with a quiet visual environment, balanced with a certain level of complexity," "Colour of the wall, carpet, furniture and display can all contribute to the colour scheme of a classroom. However, it is the room colour (wall and floor) that plays the most important role" (Barrett et al. 688). Finally, they found that the six environmental factors of light, choice, flexibility, connection, complexity, and color "account for, in the order of, 25% of the learning progression of pupils" (Barrett et al. 688).

literature review

City Tech has a tremendous opportunity to be an innovator in learning spaces for the benefit of its students and to achieve its institutional goals. Considering the philosophy behind learning spaces, there are many different ways to deploy flexibility and adaptability into City Tech's GenEd classrooms. The most radical, with the greatest potential payoff, would be to remodel a small selection of GenEd classrooms, pair these rooms with instructors willing and able to use these new classroom's affordances in their GenEd classes, and assess how well they work by surveying instructors and students and measuring student learning outcomes against control classrooms (similar rooms in the same buildings that are not remodeled). The most cost effective, with a strong potential payoff, would be to outfit a standard GenEd classroom with new furniture, such as The Node or KI Learn2, pair these rooms with instructors willing and able to use these new classroom's affordances in their GenEd classes, and assess how well they work by surveying instructors and students and measuring student learning outcomes against control classrooms (similar rooms in the same buildings that use a standard tablet arm chair). With this information, City Tech can strategize how best to use these techniques to make improvements that support our students and the goals of the institution. Additionally, publication of these efforts would highlight City Tech's investment in classroom design, which would elevate the institution's prestige and potentially attract investment from donors and partners.

Ambrose et al. use the term "classroom climate" to describe the holistic learning environment within each class. They define "classroom climate" as, "the intellectual, social, emotional, and physical environments in which our students learn" (Ambrose et al. 170). They argue persuasively that positive modification to the holistic classroom climate returns dividends in student learning outcomes. While describing the extent of what can and cannot be controlled within the classroom climate, they write that, "While we cannot control the [students'] developmental process, we can shape the intellectual, social, emotional, and *physical aspects of the classroom climate in developmentally appropriate ways.* In fact, many studies have shown that the climate we create has implications for our students. A negative climate may impede learning and performance, but a positive climate can energize students' learning" (Ambrose et al. 6, emphasis added).

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national context

universities and colleges redefining classroom design

national context

Universities and colleges around the country are increasingly exploring the benefits of innovative classroom environments that move beyond a lecture focused model of education. Some have formed faculty institutional committees specifically around this topic. Pilot programs are becoming more common, with assessment of student learning providing evidence of impact. The findings are being integrated into planning documents and design guidelines for renovations and new construction of classrooms. The list below provides some examples of the types of studies, reports, and guidelines found in universities and colleges across the country.

Georgia Institute of Technology

In this document, Georgia Tech outlines the key principles for classroom design:

1. Classrooms should facilitate student engagement
2. Classrooms should facilitate student collaboration
3. Classrooms should facilitate connections between teachers & students
4. Classrooms should incorporate appropriate technology.
5. Classrooms should have flexible physical arrangements

Center For The Enhancement Of Teaching And Learning. “Teaching for Learning: A Philosophical Approach to Classroom Design - Five Basic Principles.” Center for the Enhancement of Teaching and Learning, Georgia Institute of Technology, spring 2009. Web. 25 Apr. 2016. http://www.s3.cetl.gatech.edu/sites/default/files/documents/classroom_design_-_principles_and_information_for_georgia_tech.pdf

Morgan State University

AIA supported study of the “extent the design of the physical learning space contributes to enhanced learning outcomes in an undergraduate, active learning class of ethnically diverse students”.

Determine, James, Mary Anne Akers, Isaac Williams, Christine Hohmann, and Catherine Martin-Dunlop. “Learning Space Design for the Ethnically Diverse Undergraduate Classroom.” SCUP Book. Society for College and University Planning, n.d. Web. 25 Apr. 2016. http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab106445.pdf

national context

University of Minnesota

In their evaluation of a pilot program of active learning classrooms, responses to a questionnaire by faculty using the active classrooms noted improved and deeper relationship with students and more collaboration between students. Student responses to a questionnaire showed "very positive" reactions to active learning classrooms, including the positive impacts on teamwork and collaborative projects as well as the encouragement of discussion during classes. Students also felt more connected to their instructor and their classmates.

Alexander, Deb, Bradley Cohen, Steve Fitzgerald, Paul Honsey, Linda Jorn, John Knowles, Peter Oberg, Jeremy Todd, J.D. Walker, and Aimee Whiteside. ***Active Learning Classrooms Pilot Evaluation: Fall 2007 Findings and Recommendations.*** Rep. Minneapolis: U of Minnesota, 2008. Web. 2 May 2016. http://www.classroom.umn.edu/projects/alc_report_final.pdf

Arizona State University

ASU's classroom design guide includes space planning guidelines linked to teaching style:

Lecture Room:	17 square feet/student
Collaborative/Seminar:	22 square feet/student
Computer Instructional:	32 square feet/student.

ASU's guide also argues for alternative approaches to the tablet armchair lecture room, where rooms can "accommodate a variety of teaching methods, quick re-configuration, and technology." Programming exercises reveal faculty and student demand for flexible space and collaborative work spaces. Larger flat work surfaces are recommended in lieu of tablet armchairs to accommodate technology and books. Teamwork and collaborative work are promoted as more appropriate for current preparation for the workforce.

Classroom Design Guide. Rep. Arizona State University, May 2013. Web. 2 May 2016. <https://www.asu.edu/fm/documents/project_guidelines/Classroom-Design-Guidelines.pdf>.

national context

University of California, Berkeley

Faculty discuss the value of an active learning environment and the virtues of flexible arrangements that allow them to adjust the setting to enhance the goals for that day's class.

"Active Learning: Using Flexible Furniture." *You Tube.* University of California, Berkeley, 1 May 2015. Web. 3 May 2016. <https://youtu.be/epkrMKxRjss?list=PLNumXaqPunZleqgphXIR8WYnnQbOfaNRd>.

University of Indiana

Faculty discuss the value of an active learning environment and the particular advantages of classrooms designed around this mode of learning. Faculty and students reflect on the use of technology, the efficacy of group work, and the intimacy the environment fosters between student and instructor.

"Collaborative Learning Studio at IU Bloomington." *YouTube.* University of Indiana, 1 Feb. 2014. Web. 03 May 2016. <https://youtu.be/V--U83Zz8Do?list=PLNumXaqPunZleqgphXIR8WYnnQbOfaNRd>.

University of Michigan

Michigan's classroom planning guide includes space guidelines linked to teaching style:

Lecture Room:	20 square feet/student
Collaborative/Seminar:	25 square feet/student
Active Learning Classroom:	30 square feet/student

Michigan's document on classroom planning emphasizes assessing the effectiveness of existing classrooms and seeking feedback from faculty, staff, and students to help determine "what types of room configurations, furniture, technology, and amenities work well for current and pedagogical needs." This feedback can be gained through formal surveys or focus groups. The planning document notes the unique role student feedback can play in planning classroom spaces: "students offer a completely different perspective from faculty or staff when planning classrooms. They are able to identify things that only those who spend several hours a week in the space can identify, such as the lack of a clock, obstructions in the view to the instructor, or acoustical or lighting issues." Michigan's recommended process for planning new classrooms or renovations of existing classrooms includes forming a dedicated Classroom Design Working Group to seek feedback and define the requirements.

Considerations for Planning New General Purpose Classrooms. Rep. University of Michigan, 18 May 2012. Web. 2 May 2016. <http://www.provost.umich.edu/space/instruct/ClassroomPlanningConsiderations.pdf>.

university context

CUNY MASTER PLAN

university context

Both the *2012-2016* and the *2016-2020 (draft) CUNY Master Plans* speak of the imperatives of a 21st century education that prepares students for 21st century careers. Recurring themes in both documents are active learning and student engagement. Digital technology is projected by the Trustees as a critical tool in the classroom to facilitate students' acquiring the information literacy and digital technology skills requisite for jobs of today and tomorrow. Digital technology is considered essential as a classroom tool to address common learning challenges facing CUNY students. Undergraduate research is promoted as an growing integral component of classroom activity. The excerpts below from each master plan reinforce the key issues explored in this report.

According to the draft ***CUNY Master Plan 2016-2020,*** one of the key planning issues involves technology and classrooms: "CUNY must more fully exploit technology as a critical tool for teaching, learning, and service to the community. Technology is reorienting higher education in ways that supersede geographical distance. New technological tools, ***new classroom platforms,*** blended learning opportunities, and wholly online programs are transforming teaching and learning, and knowledge generation through expanded use of data analytics" (10, emphasis added). Furthermore, the issue of space and space utilization is noted as a significant planning issue: "CUNY must plan for expansion in a complex and expensive real estate market. Protecting and improving prior investments in infrastructure and institution building will be increasingly important, and the university must also look for opportunities to ***repurpose space*** and partner with other institutions to accommodate programmatic and institutional needs" (11, emphasis added). The issue of "space limitations" is noted twice in the Master Plan with solutions of more sections of high-demand classes and hybrid/online sections (31 and 45), but we argue that maintaining maximized student rolls in General Education classes through innovative classroom design is another way to address the space limitation issue while supporting student learning through classroom design. Additionally, maintaining student rolls in each class while providing an improved learning environment will counter some of the infrastructural deficiencies recently observed by David Chen in *The New York Times* ("Dreams Stall as CUNY, New York City's Engine of Mobility, Sputters," May 28, 2016, http://nyti.ms/25q4vVb).

university context

EXCERPTS FROM THE *CUNY MASTERPLAN 2016-2020 DRAFT*[1]

Chapter 1: Introduction - Planning Must Address Key Issues (page 10)

- CUNY must more fully exploit technology as a critical tool for teaching, learning, and service to the community. Technology is reorienting higher education in ways that supersede geographical distance. New technological tools, new classroom platforms, blended learning opportunities, and wholly online programs are transforming teaching and learning, and knowledge generation through expanded use of data analytics. The vast majority of CUNY students are digital natives, bringing to college a comfort level with technology that far exceeds previous generations. Even so, now more than ever there is a need to strengthen students' digital skills so that they are prepared for the digital demands of careers and 21st century citizenship. CUNY's students and faculty should have the opportunity to be part of this new digital era.

Chapter 3: CUNY Will Raise Success Rates - Student Engagement (pages 53-54)

- "Student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education. [It is] predicated on the belief that learning improves when students are inquisitive, interested, or inspired, and that learning tends to suffer when students are bored, dispassionate, disaffected, or otherwise disengaged."[2]

- At every level of education, including post-secondary education, higher levels of student engagement result in better learning outcomes and higher retention. Engaged students are more likely to be involved in their studies, will persist despite obstacles, and will overcome these obstacles to progress toward degree completion. Students are particularly engaged when they are involved in learning activities that they find rewarding and meaningful, and when they can incorporate the material they are learning into their lives.

1 CUNY Board of Trustees. ***CUNY Master Plan 2016-2020 DRAFT.*** CUNY. 2016. Web. 19 July 2016. <http://www1.cuny.edu/sites/6/wp-content/uploads/sites/6/media-assets/CUNY-Master-plan_DRAFT_20160507.pdf>.

2http://edglossary.org/student-engagement/.

- There are a number of “high impact practices” that education research suggests increase rates of student engagement, retention, and thus degree completion, especially for students from underrepresented groups. These include first-year seminars, learning communities, collaborative assignments, undergraduate research, global learning, service learning, and internships. For many low- income, first generation students, college is an alien environment. These and other high impact practices, along with appropriate interpersonal interactions and extracurricular offerings, can help mitigate this alienation and foster student engagement, which in turn will encourage students to invest in their learning and to progress toward a degree.

Chapter 4: CUNY Will Set the Standard for Academic Quality in the Urban University - Undergraduate Research (pages 78-79)

Involving undergraduate students in faculty research has been a feature at CUNY for many years, but over the last decade, in particular, the university undertook more systematic efforts to institutionalize undergraduate research across the colleges, including the formation of a CUNY-wide Undergraduate Research Council and expansion of mentored research opportunities for students at CUNY’s seven community colleges and three comprehensive colleges: Medgar Evers, the College of Staten Island, and New York City College of Technology.

Over the course of this master plan, CUNY will expand opportunities for first-year students to participate in STEM experiences combining research and classroom instruction. These experiences will be integrated into first-year gateway coursework and research methods courses, as well as peer mentoring and instruction by graduate students and postdocs. This programming is intended to socialize students into the CUNY scientific community and to instill a “growth mindset,” the idea that intelligence is not fixed, but rather can be developed. This view of intellectual growth can inspire students to confront challenges with the understanding that through hard work they can succeed at difficult academic work. CUNY will also revamp gateway STEM courses by using techniques such as flipped classrooms,which allow more time for students to actively engage with the materials they are learning through small group activities and problem solving sessions.

Through the Research in the Classroom initiative faculty will be encouraged to incorporate authentic research experiences into their courses. This initiative combines professional development workshops with a grant program to fund creative and innovative solutions integrating authentic research in a classroom setting, thus broadening participation of undergraduate students in this high impact practice. The workshops are held on a biennial basis and include platform presentations, poster sessions by faculty, breakout sessions on assessment, and discipline-specific approaches to designing research projects that work in a classroom setting.

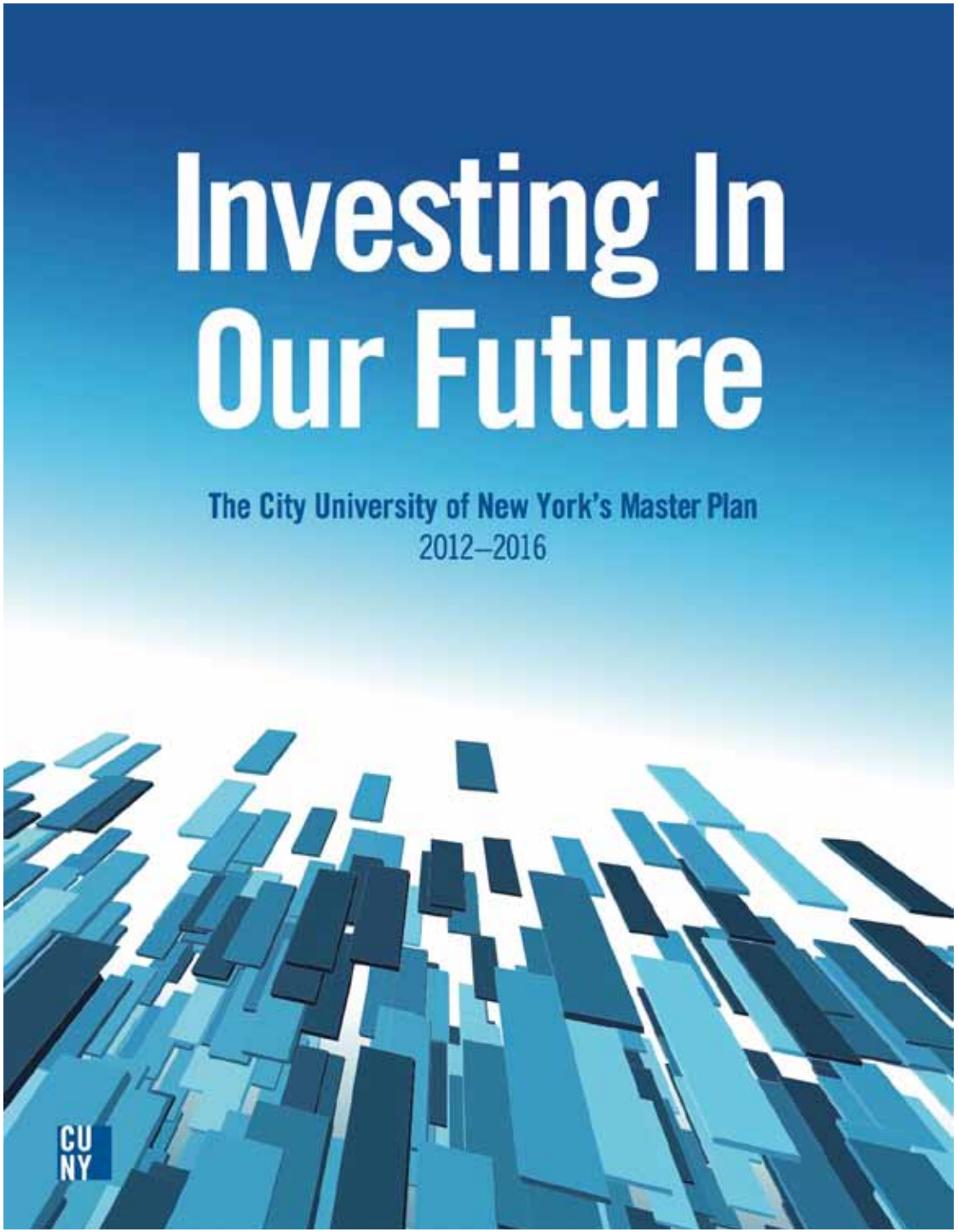
EXCERPT FROM THE *CUNY MASTERPLAN 2012-2016* [3]

Space Guidelines (page 94)

CUNY and its consultants begin each of these plans with a space-needs analysis calculated by applying current CUNY space guidelines, approved by the state Board of Regents in 1972, to existing and projected enrollments. Because CUNY and higher education have undergone many changes over the last 40 years, benchmarking against other public urban institutions has also been factored into these analyses. How- ever, CUNY cannot continue working with outdated metrics; therefore a project to develop new space guidelines for the University began in July 2011. The new guidelines will promote 21st-century learning and all that it entails, including:

- The use of technology throughout the curriculum, research areas, and administrative functions;
- The provision for increasingly active learning environments;
- The building of community through student gathering and study spaces; and,
- The maximization of facilities resources.

3CUNY Board of Trustees. ***CUNY 2012-2016 Master Plan.*** Rep. CUNY, 2012. Web. 19 July 2016. <http://www2.cuny.edu/wp-content/uploads/sites/4/2014/12/masterplan.pdf>.


Investing In
Our Future
The City University of New York's Master Plan
2012–2016
CU
NY

accreditation context

middle states commission on higher learning standards

accreditation context

Learning space planning, design, and assessment can play an important role in City Tech's Middle States accreditation. According to Middle States' 13th edition of *Standards for Accreditation and Requirements of Affiliation,* the "setting" of student learning experiences is featured in Standards III and IV as emphasized below.

Standard III

Design and Delivery of the Student Learning Experience

An institution provides students with learning experiences that are characterized by rigor and coherence at all program, certificate, and degree levels, regardless of instructional modality. All learning experiences, regardless of modality, program pace/ schedule, level, and ***setting*** *are consistent with higher education expectations.*

Standard IV

Support of the Student Experience

Across all educational experiences, ***settings,*** *levels, and instructional modalities, the institution recruits and admits students whose interests, abilities, experiences, and goals are congruent with its mission and educational offerings. The institution commits to student retention, persistence, completion, and success through a coherent and effective support system sustained by qualified professionals, which enhances the quality of the learning environment, contributes to the educational experience, and fosters student success.*

Improved classroom design can heighten City Tech's emphasis on supporting faculty and satisfy Standard III, Criteria 2: "student learning experiences that are designed, delivered, and assessed by faculty (full-time or part-time) and/or other appropriate professionals who are . . . . provided with and utilize sufficient opportunities, ***resources,*** and support for professional growth and innovation" (emphasis added).

As is demonstrated by the Literature Review, student learning outcomes are easily and significantly improved with an improvement to learning space design. Thus, an infrastructural investment in learning spaces can improve student learning outcome assessment, and support Standard V through better student learning outcomes, potentially higher retention and graduation rates, and improvement of programs and services:

accreditation context

Standard V

Educational Effectiveness Assessment

Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals consistent with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.

Criteria 3. Consideration and use of assessment results for the improvement of educational effectiveness. Consistent with the institution's mission, such uses include some combination of the following:

a. assisting students in improving their learning;
b. improving pedagogy and curriculum;
g. improving key indicators of student success, such as retention, graduation, transfer, and placement rates;
h. implementing other processes and procedures designed to improve educational programs and services;

Finally, City Tech can leverage its existing classroom space for a higher return on investment than building new classroom space, which can also support Standard VI:

Standard VI

Planning, Resources, and Institutional Improvement

The institution's planning processes, resources, and structures are aligned with each other and are sufficient to fulfill its mission and goals, to continuously assess and improve its programs and services, and to respond effectively to opportunities and challenges.

Criteria 2. clearly documented and communicated planning and improvement processes that provide for constituent participation, and incorporate the use of assessment results;

Criteria 4. fiscal and human resources as well as the physical and technical infrastructure adequate to support its operations wherever and however programs are delivered;

Criteria 6. comprehensive planning for facilities, infrastructure, and technology that includes consideration of sustainability and deferred maintenance and is linked to the institution's strategic and financial planning processes;

college context

gen ed work on campus

college context

City Tech has made significant investments in developing the pedagogical techniques and approaches for improved General Education learning outcomes through the Living Lab initiative. While the emphasis so far has been on improved faculty training, mentorship, and curriculum development, the next step for achieving improved student learning outcomes is the implementation of General Education learning environments that support and strengthen these institutional investments in faculty and curricular development. Improvements in classroom environments, technologies, and furniture buttress and undergird the learning experiences fostered by City Tech faculty for their students.

IMPORTANT GENERAL EDUCATION LEARNING GOALS—ADOPTED BY COLLEGE COUNCIL MARCH 2013:

New York City College of Technology aspires to be a living laboratory where General Education

- is represented by a mutually accepted core of knowledge, skills, and values that permeate all courses, not only in the liberal arts and sciences, but across the majors.
- makes rich use of the physical, historical, economic, and cultural aspects of our location in a diverse urban community
- stresses active learning and creative problem solving
- encourages engagement in personal, professional, and civic communities
- integrates theory/ knowledge and hands- on/ application
- maintains a global focus/ perspective
- is communications intensive

college context

LIVING LAB GRANT

New York City College of Technology (City Tech) was awarded a $3.1 million grant from the U.S. Department of Education (DOE) under its Strengthening Hispanic-Serving Institutions (HSI) Title V Program with the goal of connecting City Tech students, faculty and curriculum to the dynamic “Living Laboratory” of the Brooklyn Waterfront in new and creative ways. The main mission of the grant titled, “A Living Laboratory: Revitalizing General Education for a 21st Century College of Technology,” is to re-envision General Education as a Living Laboratory using City Tech’s strengths: hands-on experiential models of learning and the vibrant Brooklyn Waterfront location. Among the four interrelated activities of the “Living Lab” grant, one is the General Education Seminar that brings together diverse groups of faculty fellows from across disciplines at City Tech to re-imagine and revitalize General Education.

BRIDGING THE GAP PROFESSIONAL DEVELOPMENT SEMINARS

This is a study group sponsored by Faculty Commons, bringing together like minded groups of professors, from different departments, interested in cognitive research and instructional practice. The faculty meet in multiple groups, led by Faculty Commons facilitators. In the seminar faculty discuss the seven research-based principles for smart teaching and how to apply these principles in our teaching practice.

(text: Ambrose, Susan A. “How Learning Works: Seven Research-based Principles for Smart Teaching.” San Francisco, CA: Jossey-Bass, 2010. Print.

Part II

three learning spaces

testing strategies for active learning environments

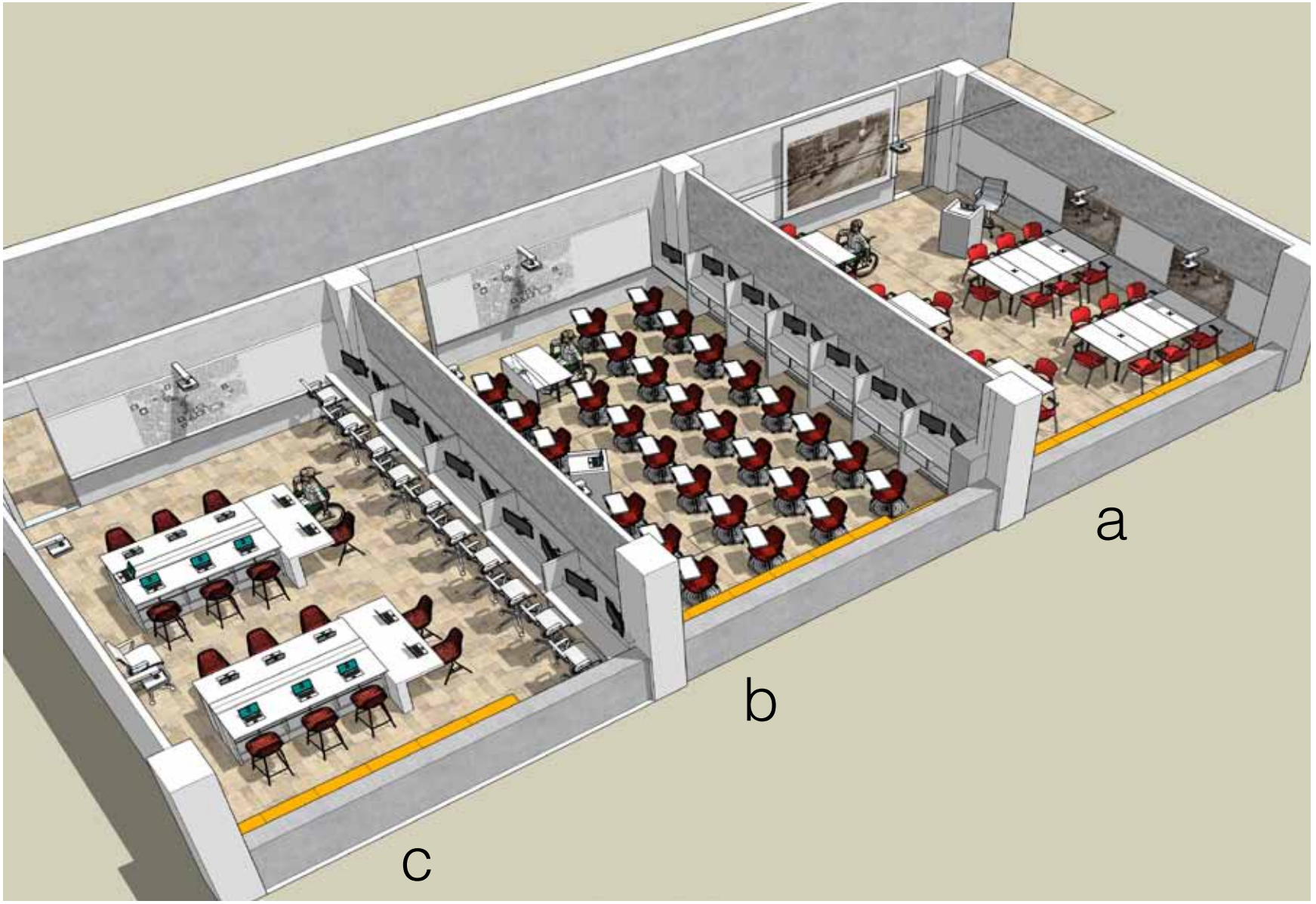
three learning spaces

overview

Based on the current research in the field of learning spaces and the pragmatic reality of established classroom construction in much of City Tech's existing building spaces, we explore several models of classroom design that meet the seating capacity requirement of Gen Ed classrooms while adopting new layouts that improve the pedagogical use of these spaces for a variety of different pedagogical styles ranging from tradition (lecture) to dynamic (active learning, collaboration, peer-to-peer learning, teamwork, and technology rich).

To simplify our design suggestions and to reconsider a constraint as an auspicious affordance, we focused on the typical Namm Building classroom and its approximate 21' x 29' dimensions (617 sq.ft) to re-imagine learning space possibilities at City Tech. Within this space, we propose three different furniture layouts that incorporate a student seating capacity of 35, 29, and 26 students respectively (depicted in the image above and explained in detail below). In each layout, there are different affordances, such as different types of seating, student work arrangements, and classroom technology, and different constraints, such as seating capacity and furniture movement.

All three designs share a common theme of dynamic reconfiguration for student learning experiences and different faculty pedagogies. Each also shares an incorporation of new forms of technology into the Gen Ed learning space (some more, some less). Despite new furniture and different types of computer and display technology, it should be noted that unclaimed wall space in the designs would be filled with whiteboards to accommodate the full gamut of teaching styles and learning opportunities.


a
b
c

three learning spaces

a: collaboration+group work

35 students @ 17.63 sq. ft. / student

b: multi-modal (lecture +)

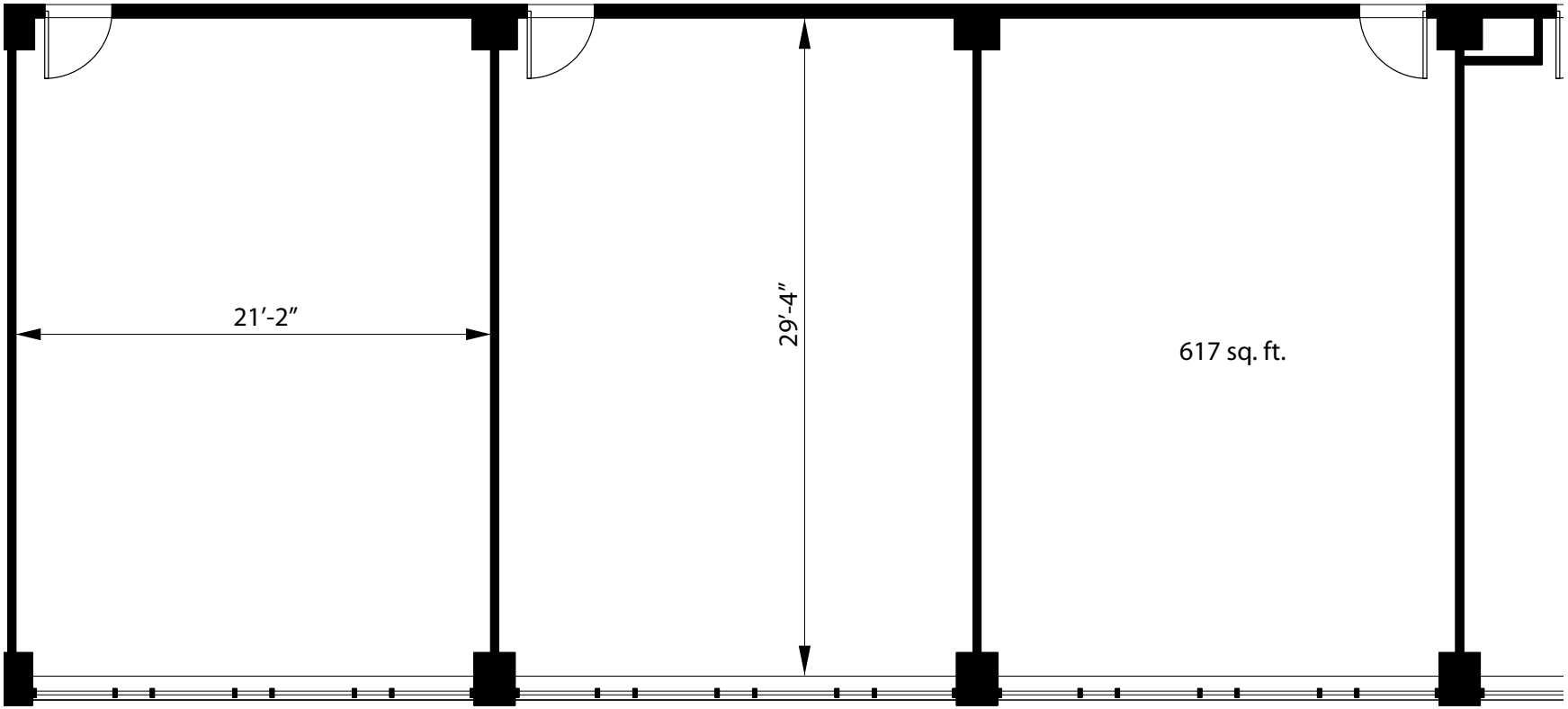
29 students @ 21.28 sq. ft. / student

c: active learning lab

26 students @ 23.73 sq. ft. / student

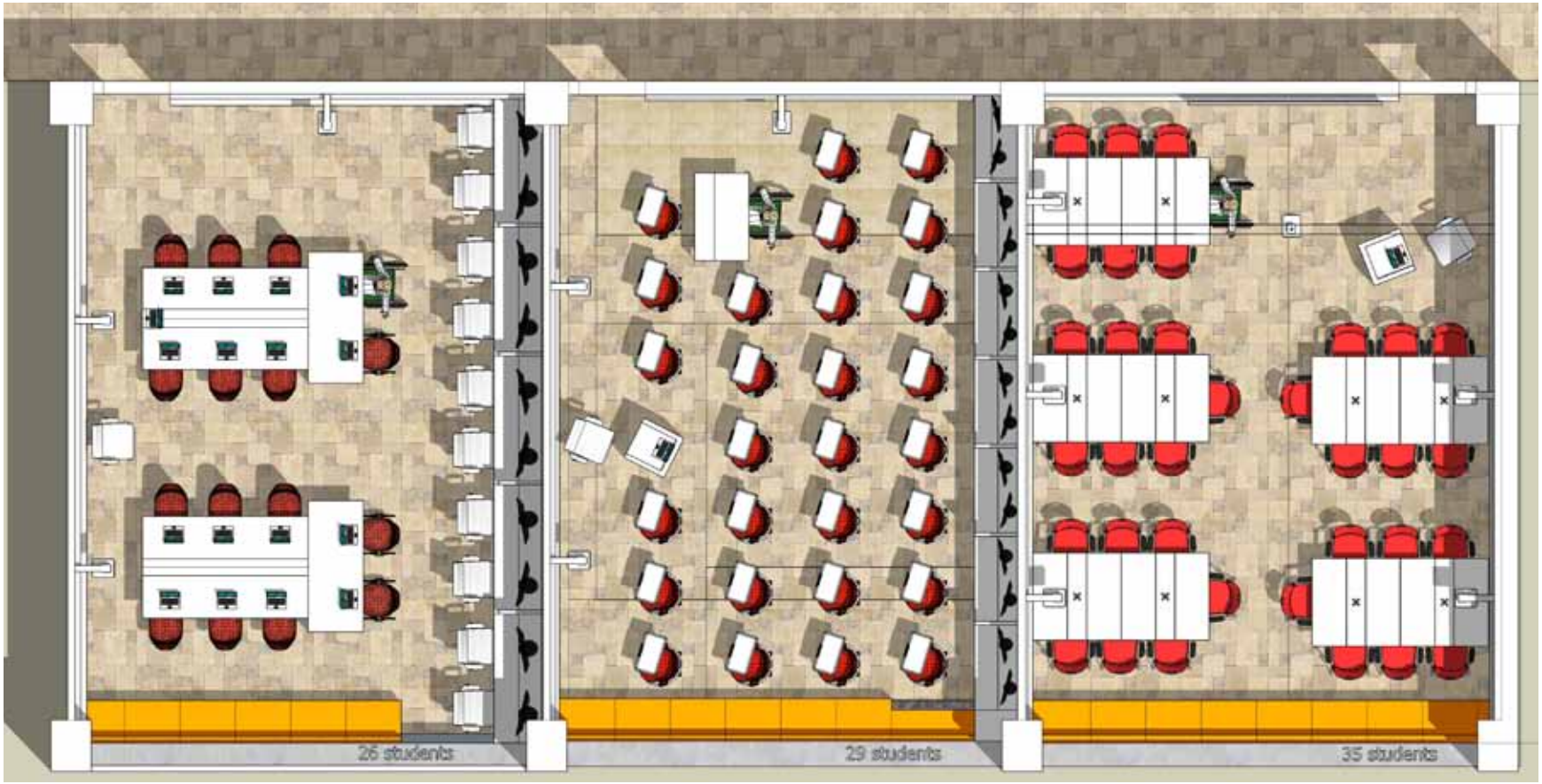
existing space

Namm Hall typical classroom



35 students: 17.63 sq. ft. / student
32 students : 19.28 sq. ft. / student
29 students: 21.28 sq. ft. / student
26 students: 23.73 sq. ft. / student

three possibilities



c b a

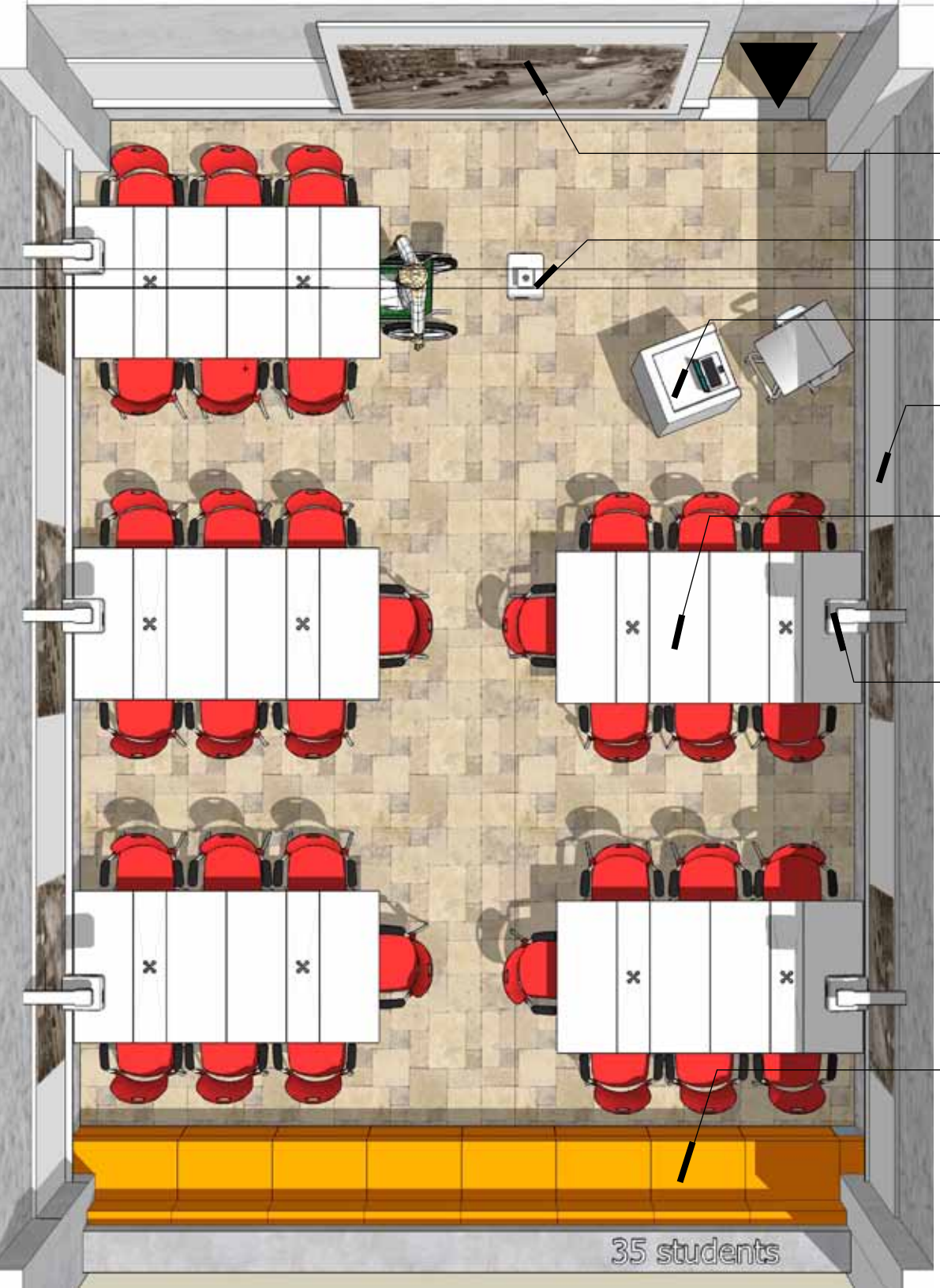
35
students

learning space a
collaboration + group work

SUMMARY:

This classroom is built around collaboration, discussion, and group work, fostering routine interaction between the students before and during class. Students can follow the instructor's presentation locally on the whiteboard adjacent to the table. Group project work or group discussion is enhanced by local projection capability from student laptops or college supplied devices as well as annotation and notes on the whiteboard surface.

This layout de-emphasizes a "front" or "back" of the classroom. Chairs are supplied with wheels to allow for easy rotation and movement. The tables fold and move out of the way for re-configuration of the room.



DROP-DOWN SCREEN FOR LARGE SCALE PROJECTION

CEILING PROJECTOR FOR LARGE SCALE PROJECTION

INSTRUCTOR'S PODIUM

WHITEBOARDS ON 3 WALLS

GROUP TABLE FOR 7 STUDENTS ADJACENT TO WALL OUTLETS FOR POWER + DATA

5 SHORT THROW PROJECTORS ABOVE EACH GROUP TABLE. CONTROLLABLE LOCALLY BY STUDENTS AT TABLE OR INSTRUCTOR'S PODIUM.

WINDOW BENCH (INFORMAL) SEATING FOR USE IN ALTERNATIVE ROOM CONFIGURATIONS + PRE/POST CLASS TIME ACTIVITY

DESCRIPTION:

Instead of using tablet armchairs as is found in the traditional Namm classroom, this design utilizes moveable tables to create learning space centered on teams of seven students. With five tables in each classroom, this design accommodates 35 students with room for the instructor's podium and chair, and ample walking space between the center of the classroom and between the seating. An informal seating bench runs along the back wall beneath the window, offering a place for casual lounging before or after class.

Each table gives its seven students adequate space for their notebook, a textbook, and BYOD technology. The tables are designed to fold into a small footprint for reorganization of the space for seated lecture, student presentations, technology demonstrations, or film viewing.

furniture
possible selections

HERMAN MILLER

CAPER STACKING
CHAIR
W/ CASTERS

35 TOTAL

HERMAN MILLER

INTERSECT FOLD-
AWAY TABLE
(SQUARE) 4'x4'

10 TOTAL

HERMAN MILLER

CAPER
MULTIPURPOSE
STOOL

1 TOTAL

EPSON

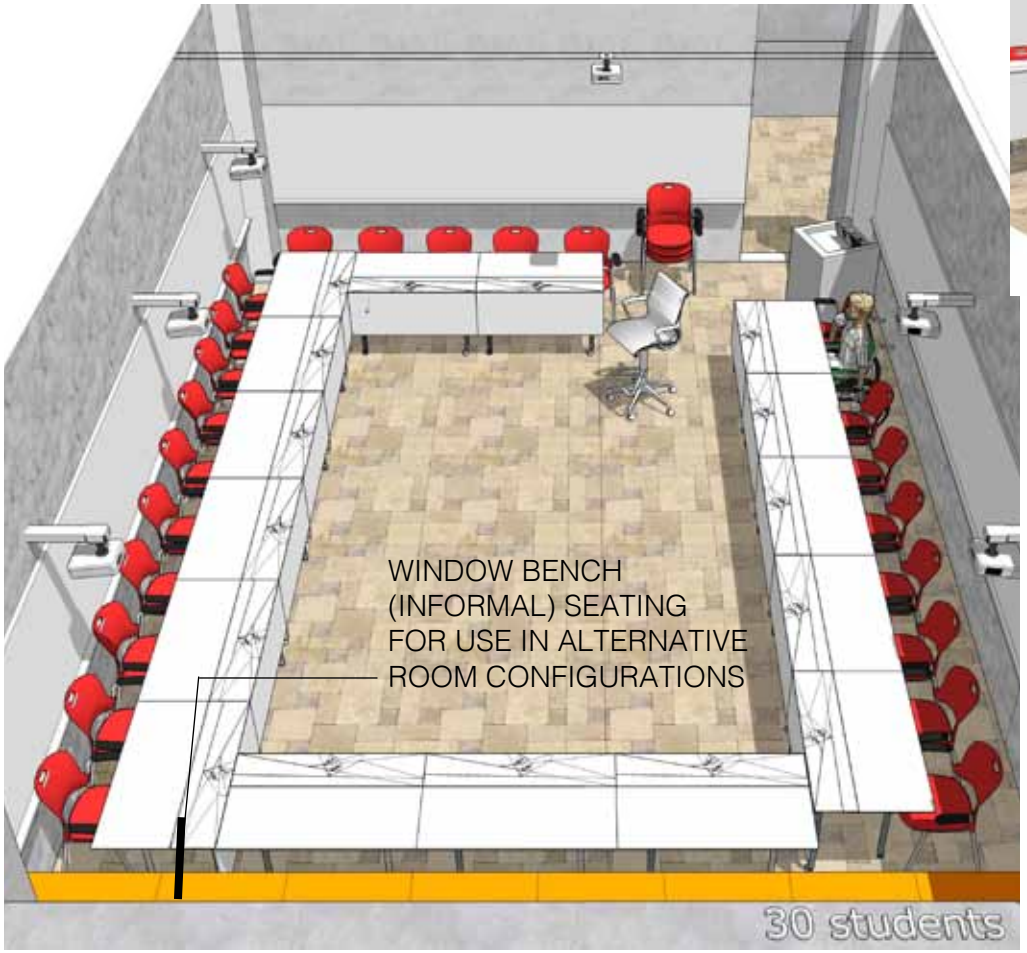
EB-595WI
PROJECTOR

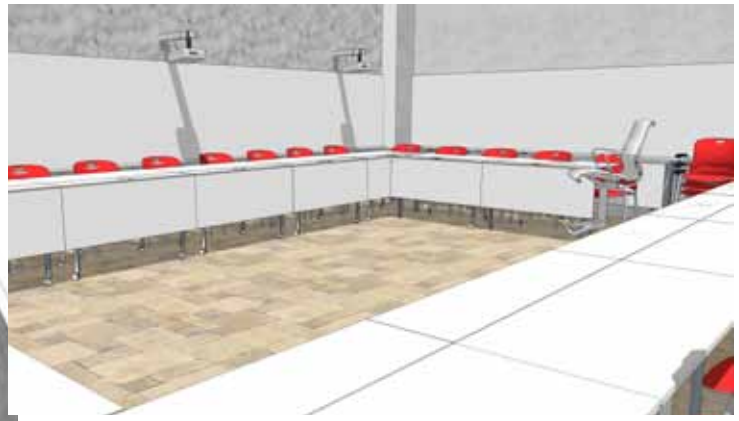
or similar

6 TOTAL

reconfigured space

learning space a





The technology in this classroom includes a front mounted LCD display or projector connected to the instructor's podium computer. Along the two sidewalls, five LCD displays or projectors are mounted adjacent to each table and mirror the video content of the instructor's podium computer.

This classroom design maximizes student seating and student tabletop workspace for a variety of different Gen Ed classes. Using tables facilitates different kind of student work ranging from individual work, collaborative work, and peer review. In addition to using paper notebooks, students can use larger forms of paper, such as newsprint tablets, for writing and drawing according to the assignments given to them by their instructors.

learning space b

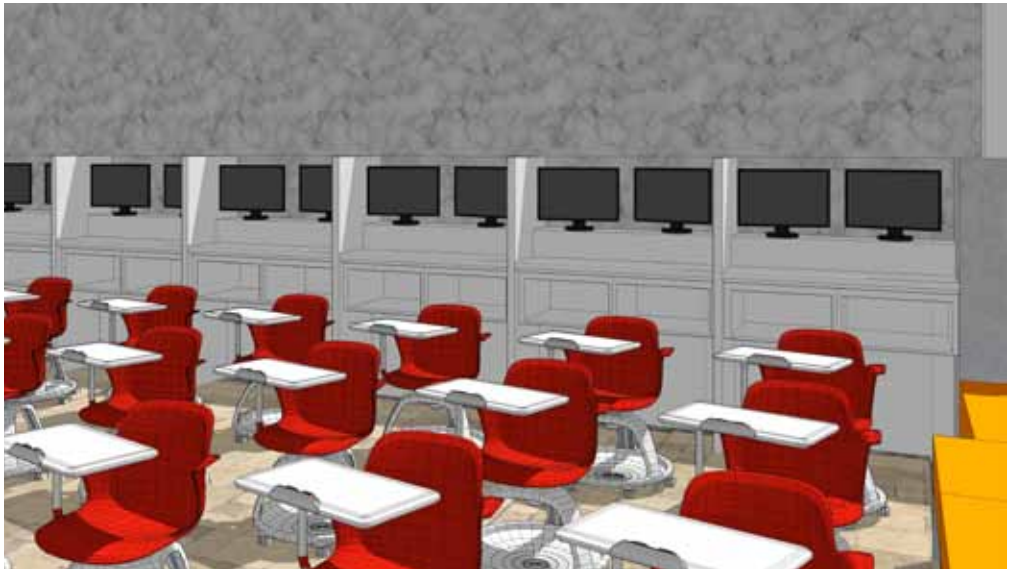
multi-modal (lecture +)

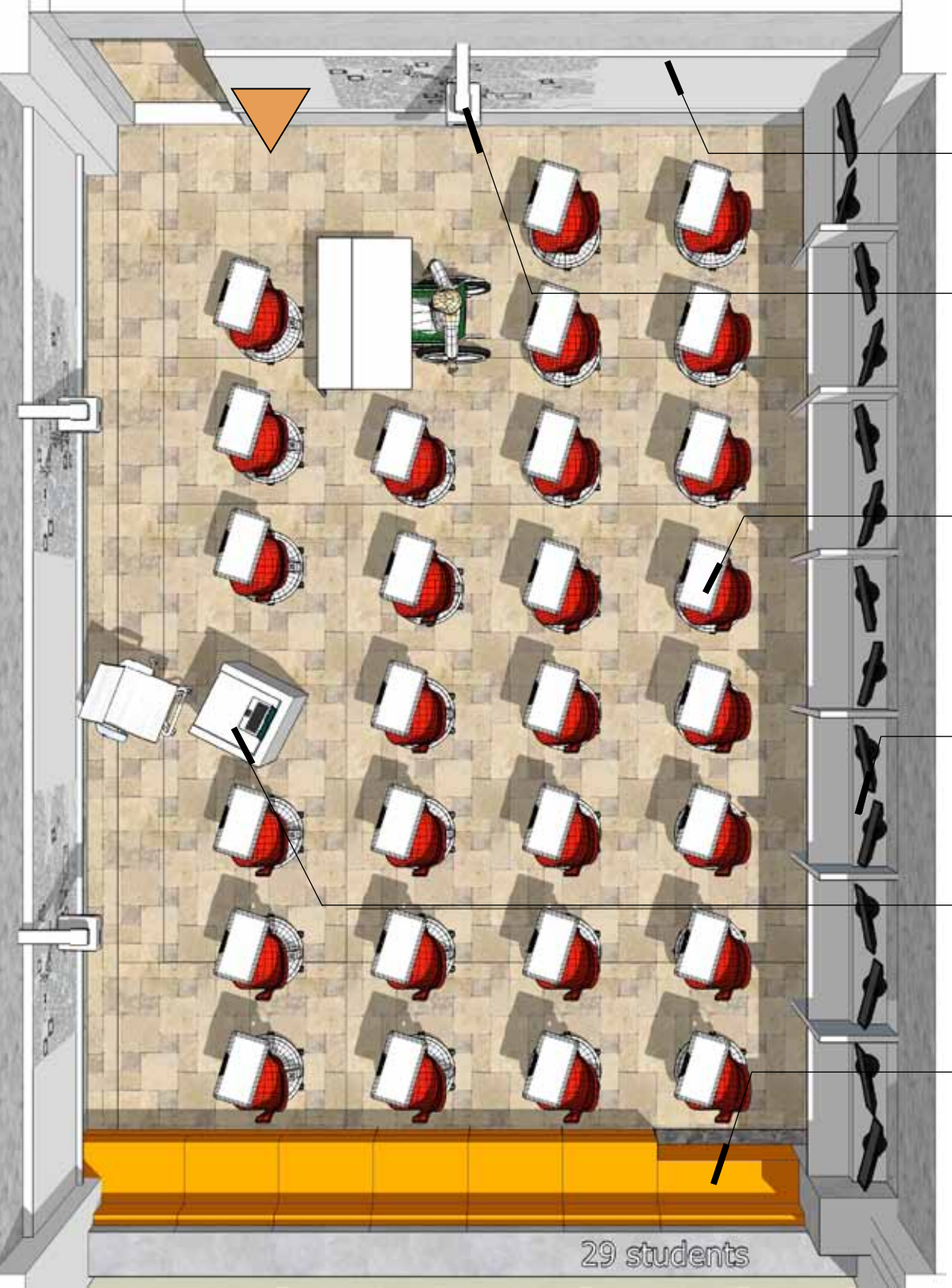
29
students

SUMMARY:

This classroom provides a traditional lecture setting with a primary projection wall and instructor podium. Three projectors facilitate increased visibility of presentations. Full length whiteboards on 2 walls allows for annotations and notes during instructor or student presentations. Two-person standing and ADA computing stations along one wall allow for in-class short duration collaborative digital work by a subset of the students.

The tablet armchairs on wheels allow for re-configuration of the room into smaller discussion groups or a seminar style circle. Informal seating is available by the windows.





WHITEBOARDS ON 2 WALLS

3 SHORT-THROW PROJECTORS FOR HIGHER VISIBILITY AND ROOM CONFIGURATION FLEXIBILITY

TABLET CHAIR ON WHEELS FOR EASY RE-CONFIGURATION OF CLASSROOM FROM LECTURE MODE TO BREAK-OUT/ DISCUSSION GROUP

COLLABORATIVE WORKSTATIONS
6 STANDING + 1 ADA

INSTRUCTOR'S PODIUM

WINDOW BENCH (INFORMAL) SEATING FOR USE IN ALTERNATIVE ROOM CONFIGURATIONS

DESCRIPTION:

Beginning with the Namm classroom space, this proposed design takes a different approach by using an innovative tablet armchair, such as the Steelcase Node, for a seating capacity of 29 students combined with seven, shared standing workstations along one sidewall, and an informal seating bench along the window wall.

The Steelcase Node tablet armchairs include a larger student workspace, caster wheels for easy and quiet rearrangement of seating, and storage space underneath the seat. They can be easily and effortlessly moved about the classroom space for a variety of seating arrangements including lecture (rows facing the front of the classroom) and breakout groups (teamwork, peer review, collaboration).

furniture
possible selections

STEELCASE

NODE MID-BACK CHAIR

TRIPOD BASE WORK SURFACE + CASTERS

29 TOTAL

BUILT-IN (4'w/2'd/5.5't)

2 PERSON STANDING WORKSTATION

POWER + DATA OUTLETS +CUBBIES

6 + 1 ADA TOTAL

HERMAN MILLER

CAPER MULTIPURPOSE STOOL

1 TOTAL

EPSON

EB-595WI PROJECTOR

or similar

6 TOTAL

reconfigured space

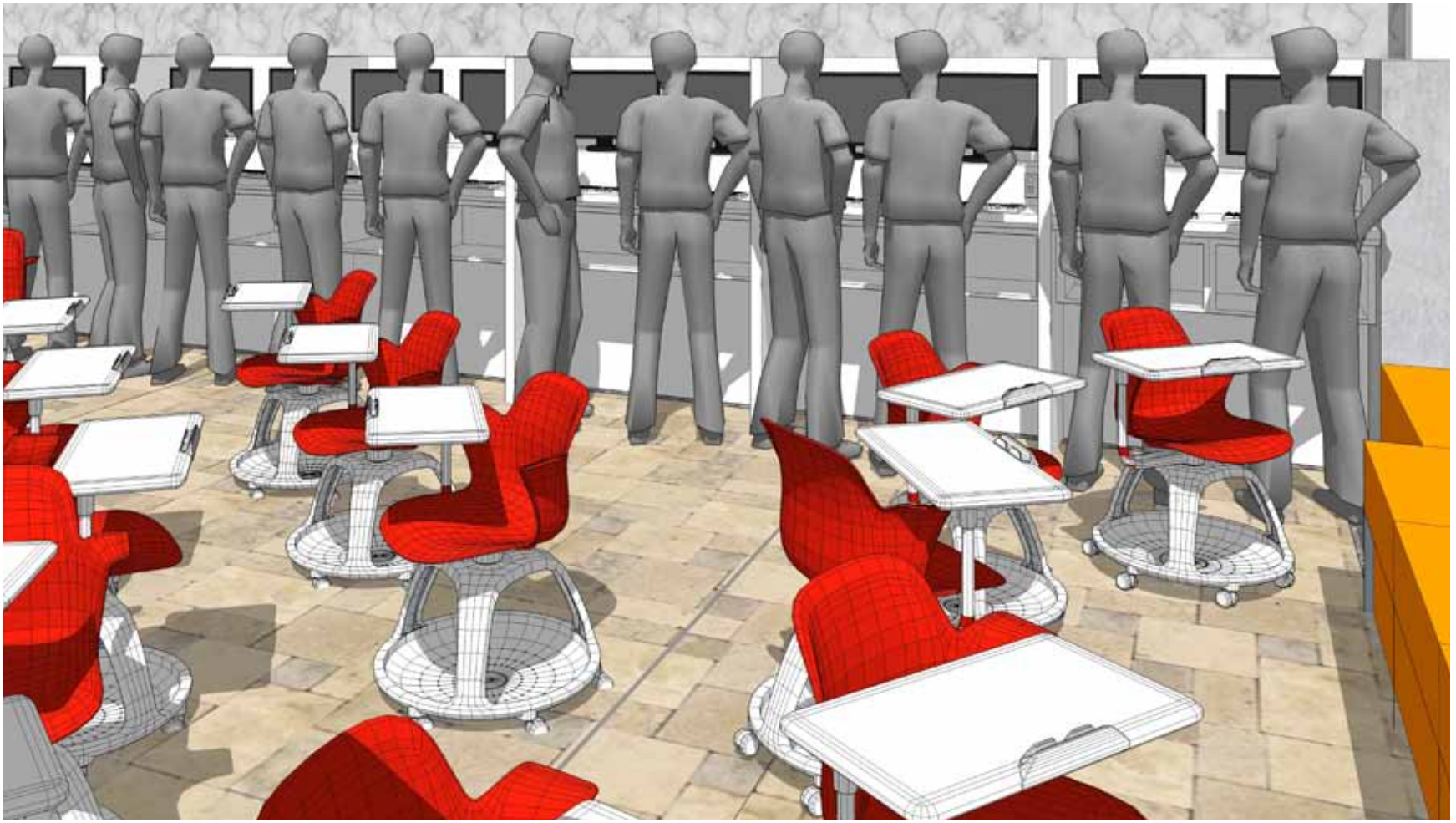
learning space b

The seven shared, standing workstations along the sidewall enable students to work in small groups or pairs to use the computer for in-class assignments, such as writing, research, or illustration. The workstations are meant to enable other kinds of technology-driven class work without placing an undue burden on students to BYOD.

The sidewall opposite of the standing workstations serves as the instructor's focal point. It includes the instructor's podium and chair, and two LCD displays or projectors connected to the instructor's podium computer (plus the additional projector on the flanking wall.)

In addition to the perspectival and top-down views of the Node tablet chairs in rows shown above, the images below and opposite depict the classroom in breakout session arrangements, which include the chairs rearranged for teams and students standing up to use the workstations along the sidewall.

Using a combination of Steelcase Node tablet chairs and the standing workstations accommodates a variety of different Gen Ed courses and opens new possibilities for pedagogical experimentation and innovation by leveraging new furniture and technology to improve the



learning environment of the fixed Namm classrooms. Furthermore, the Steelcase Node chairs facilitate an easy of classroom reorganization—of course, something that faculty do in the Namm classrooms now—in an easy and quiet way as to reduce classroom disruption in the faculty member's classroom doing the reorganization as well as reduce classroom disruption in the classrooms adjoining the reorganized classroom in all three dimensions (adjacent, across the hall, above, and below).

This design provides the greatest number of student seats for the number of possible seating configurations and classroom technology options.

In the workplace, there are different practices surrounding the kinds of work that are done while sitting and different practices surrounding the kinds of work that are done while standing. Some of these practices overlap while others are distinct to the mode of the work sitting or standing. Furthermore, there is a social aspect to the transition from one mode of work to another that combines maturity, confidence, sociality, and modes of interactivity. Of course, the transition between sitting and standing modes of work often take place in the realm of laboratory-based classes, but in the workplace, our students will find that many different realms of work-based practices require knowledge of and acumen with the transition between different modes of work. Additionally, the number of workstations and their configuration enable a variety of different kinds of collaboration and cycles of work that maintain student engagement throughout class meeting times—especially for those classes that meet for longer periods of time per meeting. It helps keep students focused on their work, it acknowledges the need of movement within the workspace, and it improves the social interactivity skills of students engaged in the development of their professionalism as well as their professional skills.

Standing workstations in Learning Space B and C provide support the aims of City Tech's new mission statement. For example, the use of different kinds of space and movement within the classroom helps "prepare its students to respond to an ever-changing world of ideas, technologies, and environments." The combination of technology and environment found in these learning spaces introduce students to arrangements that they might encounter in the workplace. This familiarity born from daily learning experiences will "prepare students for personal and professional success," because their success will follow from their natural acclimation into the mode of work required in the dynamic workplaces they are being prepared to enter.

learning space c

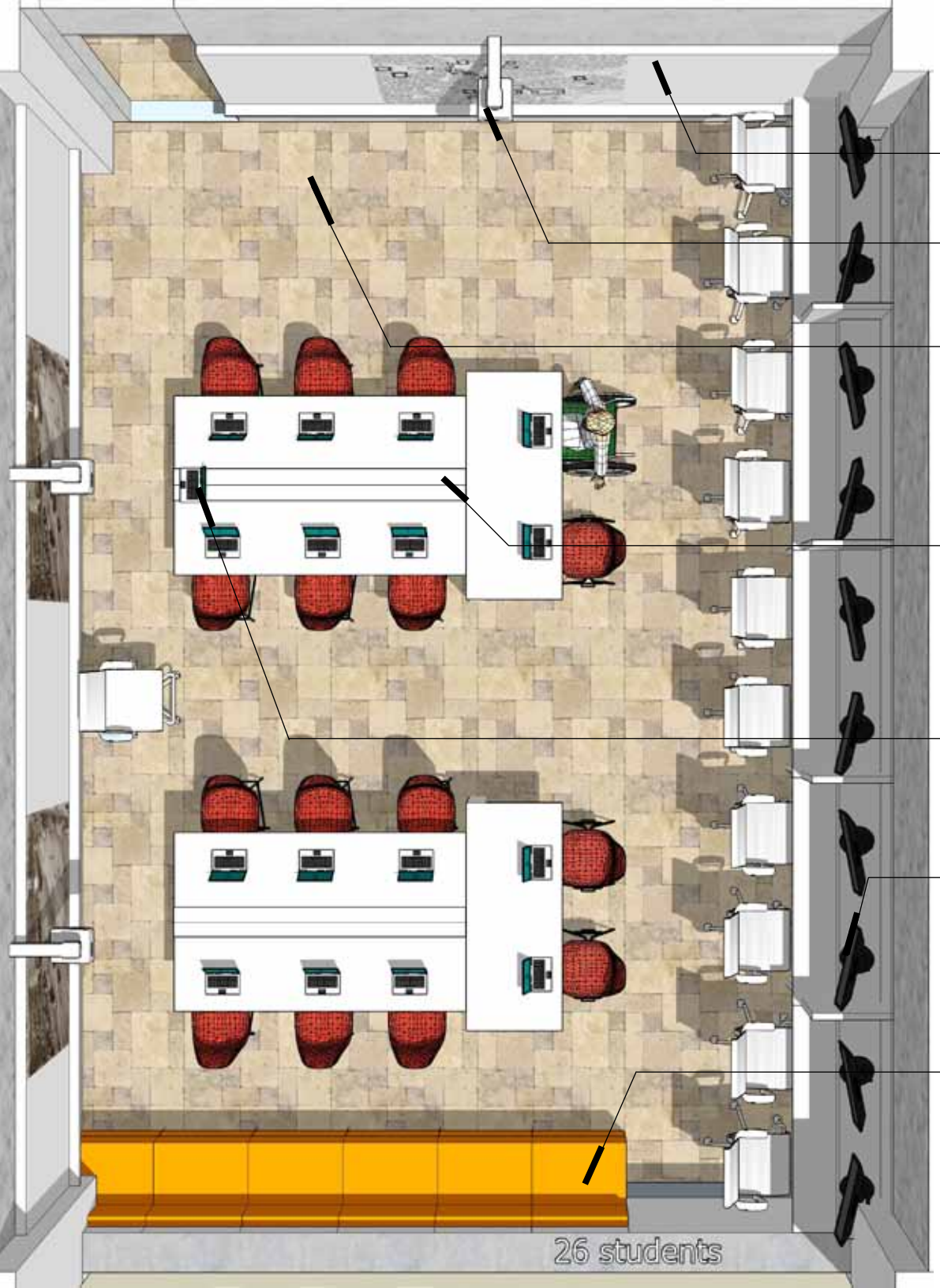
active learning lab

26
students

SUMMARY:

This classroom allows for all students to work digitally during class time, either on student or college supplied laptops or tablets, or on a bank of desktop computing stations along one wall of the room. All seating encourages teams of 2-3 students to work collaboratively on active in-class projects or assignments guided by the instructor.

College laptops and tablets are securely stored and recharged in the plan desks, which are fixed and have floor outlets for power and data. Pivoting chairs allow students along wall to quickly turn to face the instructor during presentations and discussions.



WHITEBOARDS ON 2 WALLS

3 SHORT-THROW PROJECTORS FOR SIMULTANEOUS MULTIPLE IMAGE PROJECTION

OPEN FLOOR SPACE ALLOWS GATHERING OF STANDING STUDENTS AROUND WHITEBOARD

FIXED PLAN DESK HARD WIRED W/ POWER + DATA ON TOP SURFACE. CUBBY STORAGE FOR STUDENTS + SECURE STORAGE FOR COLLEGE LAPTOPS.

INSTRUCTOR'S CONTROL POINT VIA LAPTOP (OPTIONAL WIRELESS OR WIRED CONNECTIVITY)

COLLABORATIVE WORKSTATIONS 5 SITTING STATIONS TOTAL

WINDOW BENCH (INFORMAL) SEATING ALLOWS ADDITIONAL SETTING FOR COLLABORATION OR DISCUSSION

DESCRIPTION:

In our most innovative proposed use of Namm classroom space, we combine table seating and workstation seating to enable a variety of different, yet overlapping learning experiences. This design includes two 8-seat plan desks with cubbies, laptop storage, and electrical/internet/AV outlets, and five shared seated computer workstations. Additionally, there is a window wall bench for informal seating. Not including the informal seating bench, this design accommodates 26 student seats.

In lieu of a podium, the instructor's workstation is at the opposite end of one student plan table, and it is connected to the two LCD displays or projector screens on the sidewall opposite the five shared seated computer workstations for student use as well as the additional projector on the flanking wall.

furniture
possible selections

HERMAN MILLER

EAMES PLASTIC
STOOLS (12)
CHAIRS (4)

16 TOTAL

BUILT-IN (6'w/2'd/5.5't)

2 PERSON SITTING
WORKSTATION

POWER + DATA
OUTLETS + CUBBIES

5 TOTAL

HERMAN MILLER

CAPER
MULTIPURPOSE
STOOL

1 TOTAL

EPSON

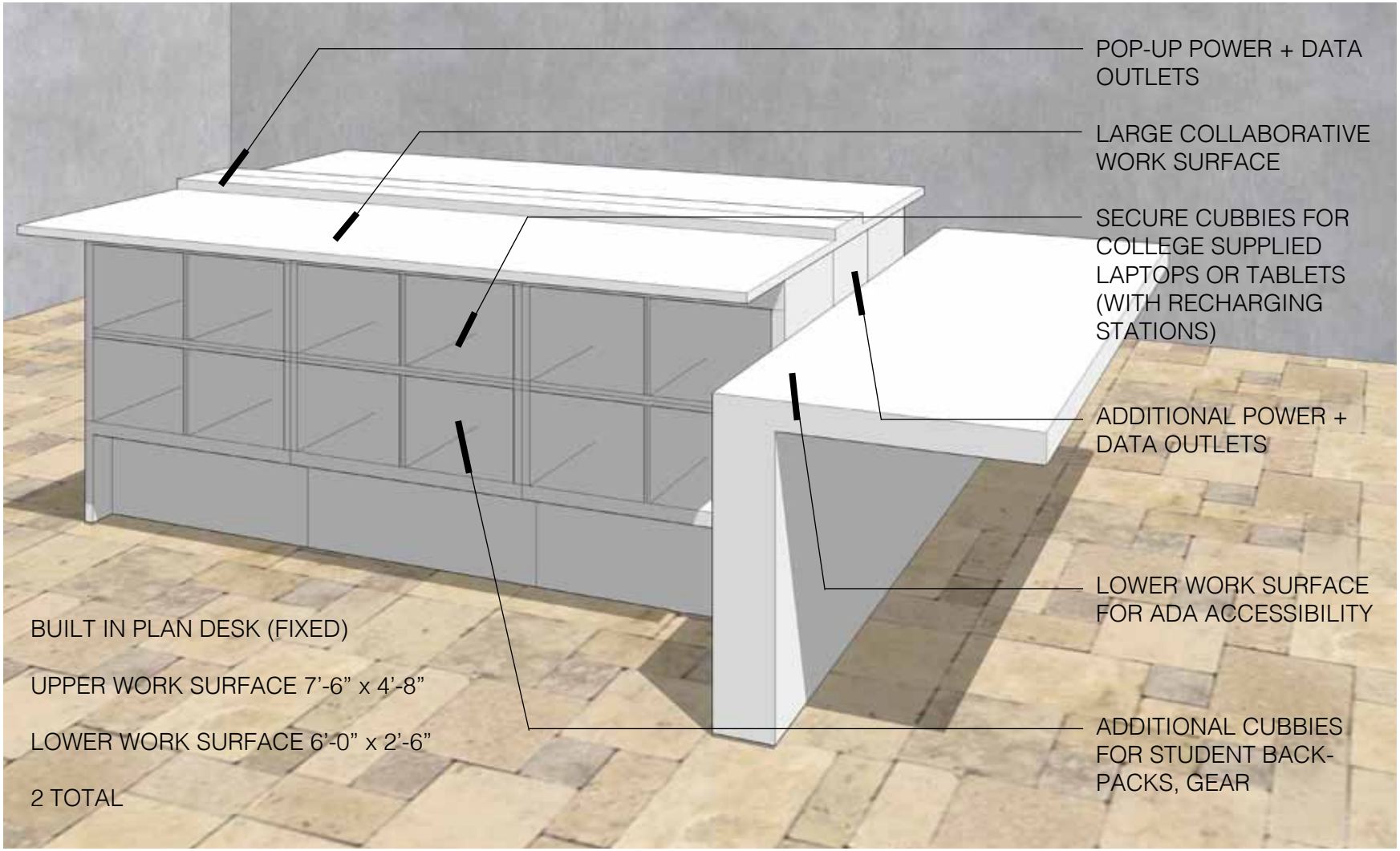
EB-595WI
PROJECTOR

or similar

6 TOTAL

This classroom arrangement enables different kinds of student work. The plan tables support laptops for individual student use, and the five shared seated computer workstations support peer-to-peer learning and collaboration. Students can rotate from one space to the other within a class period or on a class-to-class basis. The plan tables' laptops can be secured with long-lead Kinsington locks and stowed away in the cubbyholes beneath the tabletop surface. This opens the table surface for traditional notebook paper and textbook exercises without the computers taking up table space. The additional electrical and Ethernet outlets would accommodate student BYOD technology in addition to the secured laptops and shared computer workstations.

While this arrangement has the lowest student seating of the proposed arrangements, it is the most experimental and most technology rich, which could make it an ideal candidate for learning space research and utilized only by faculty with expertise or training in teaching in such a classroom.



student feedback

focus groups results

student feedback

During the spring semester of 2016, 6 focus groups comprising a total of 95 students (some responding as a group) were conducted with students to better understand their perspective on the relationship of classrooms to their engagement and learning. (Group scores are counted as a single score.)

The focus groups were selected by members of the Buildings and Grounds committee based on faculty that were willing to participate with their students. The focus groups were held with students in the following classes across the college:

1. AFR 1130 American Folklore
2. AFR 1321 Black Theatre
3. AFR 1503 The Hip Hop Worldview
4. AFR 2612 Africana Philosophy and Religion
5. ENG 3760 Digital Story Telling
6. LIB 2205/ARCH 2205 Learning Places

The focus group questions were:

1. How do the classrooms currently work well?
2. What deficiencies do our classrooms currently have?
3. Do classrooms impact your learning? How?
4. Imagine an ideal classroom:
   - What does it look like?
   - What type of furniture does it have?
   - Is there technology in the room? What type of technology?
   - Where is the professor in the room?
   - What are you looking at while the professor is talking?
5. Describe a memorable learning experience.
6. What is your favorite classroom?
7. Does the layout of furniture make a difference to your learning?
8. What mode of teaching (lecture, class discussion, group work) is most effective for you as a learner?

student feedback

STUDENTS APPRECIATE PEER INTERACTION, DEBATE, AND COLLABORATION

STUDENTS BY A WIDE MARGIN AGREE THAT CLASSROOM SPACE, TECHNOLOGY, FURNITURE, CONFIGURATION IMPACT THEIR LEARNING

STUDENTS STATE THAT THEY LEARN BETTER THROUGH CLASS DISCUSSION

STUDENTS RECOMMEND BIGGER DESKS AND MORE COMFORTABLE SEATING TO ENHANCE MOOD AND ABILITY TO FOCUS AND ENGAGE

student feedback

INDIVIDUAL SEATING DISCOURAGES INTERACTION AND SENSE OF CAMARADERIE

CLASSROOM ENVIRONMENTAL CONTROL IS A SIGNIFICANT ISSUE FOR STUDENTS, WHERE LACK OF COMFORT CAN UNDERMINE ATTENTION AND ENGAGEMENT

DAYLIGHT IS HIGHLY APPRECIATED IN CLASSROOMS AS HELPING SET A POSITIVE ENVIRONMENT FOR ENGAGEMENT

student feedback

SAMPLE OF STUDENT FOCUS GROUP RESPONSES:

Student Focus Group Responses
Professor Jason W. Ellis

This focus group is made up of four upper-level students in the Professional and Technical Writing Program. The following responses have been lightly edited for clarity.

1. How do the classrooms currently work well?

S1: They have individual desks, which are convenient.

S2: Everyone can see the professor. There is arm space. There is enough exiting space.

S3: Classrooms with evenly spaced rows or tables that all face the same direction. Also, rooms that have windows.

S4: I do appreciate small classrooms. Generally, I'd say they work well. But it all depends on the professor and the students in the class.

2. What deficiencies do our classrooms currently have?

S1: They lack proper seating organization, enough supplies, and proper temperature setting.

S2: Lack of bright natural light and lack of smart technologies.

S3: Rooms with no windows, rooms where the technology is outdated and broken, or rooms that don't have supplies—chalk and markers.

S4: Technology (lack of working Smart Board). Round (like an oval setup for desks/meetings). Cool furniture. Colors of rooms. Transparency.

3. Do classrooms impact your learning? How?

S1: They do. If the atmosphere is not conducive to learning it can affect my ability to learn, i.e., not enough air or space.

S2: Definitely—the space depicts my mood and my mood will depict how I engage with the content.

S3: Absolutely, if you're uncomfortable or unhappy in a space, you're less likely to pay attention in a class.

S4: Yes, of course it can either enhance or limit your learning. Make you happy/sad or inspired/not inspired.

4. Imagine an ideal classroom…

S1: The professor is at the front middle of the room with the students sitting in a U-shaped formation at individual desks or a long table. The technology would include desktop computers, laptops, smart screens, and Surface Pros.

S2: Stations for learning, working, and conferencing. Class walls for posting work. Natural sunlight. Brighter colors. Interactive technology for each station. One computer that the professor is sharing from working space.

S3: An ideal classroom is modern and accommodating. Neutral colors and open concept furniture. Large desks that seat three students. One smart board and two supporting monitors. Professor centered. Brightly lit and spacious.

S4: Ideal is a circular room, because rectangular/square rooms make me feel boxed in. Circles, to me, mean unity and continuous flow of ideas and learning. Technology: Macs. Professor in the middle of a circle of student desks. The students are looking at the professor and other students.

student feedback

SAMPLE OF STUDENT FOCUS GROUP RESPONSES:

5. Describe a memorable learning experience.

S1: Learning at the round table in Namm 601B.

S2: Sixth grade science classroom was divided into work and play. When doing projects and we couldn't concentrate, we would play.

S3: A memorable learning experience was in my BA Law class at BCC. We got to view archives from class action lawsuits in the new lab on the Smart Board.

S4: My most memorable learning experience was in 7th grade in Art at Booker T. Washington. Art rooms with colors and different approaches to drawing. Draw what's on your mind, not draw a tree.

6. What is your favorite classroom?

S1: None.

S2: The Namm Building's 11th floor gallery room is inviting.

S3: The Namm 11th floor classrooms for COMD. They're so openly setup and the light is phenomenal.

S4: None.

7. Does the layout of furniture make a different to your learning?

S1: Yes, if the positioning is not laid out correctly, it can affect learning.

S2: Definitely—most of the time I fight for a front seat just to be able to learn.

S3: Yes! If the room is arranged awkwardly then its hard to move around and for me would give me terrible anxiety.

S4: Yes, staging a classroom in a unique setup can enhance your learning.

8. What mode of teaching is most effective for you as a learner?

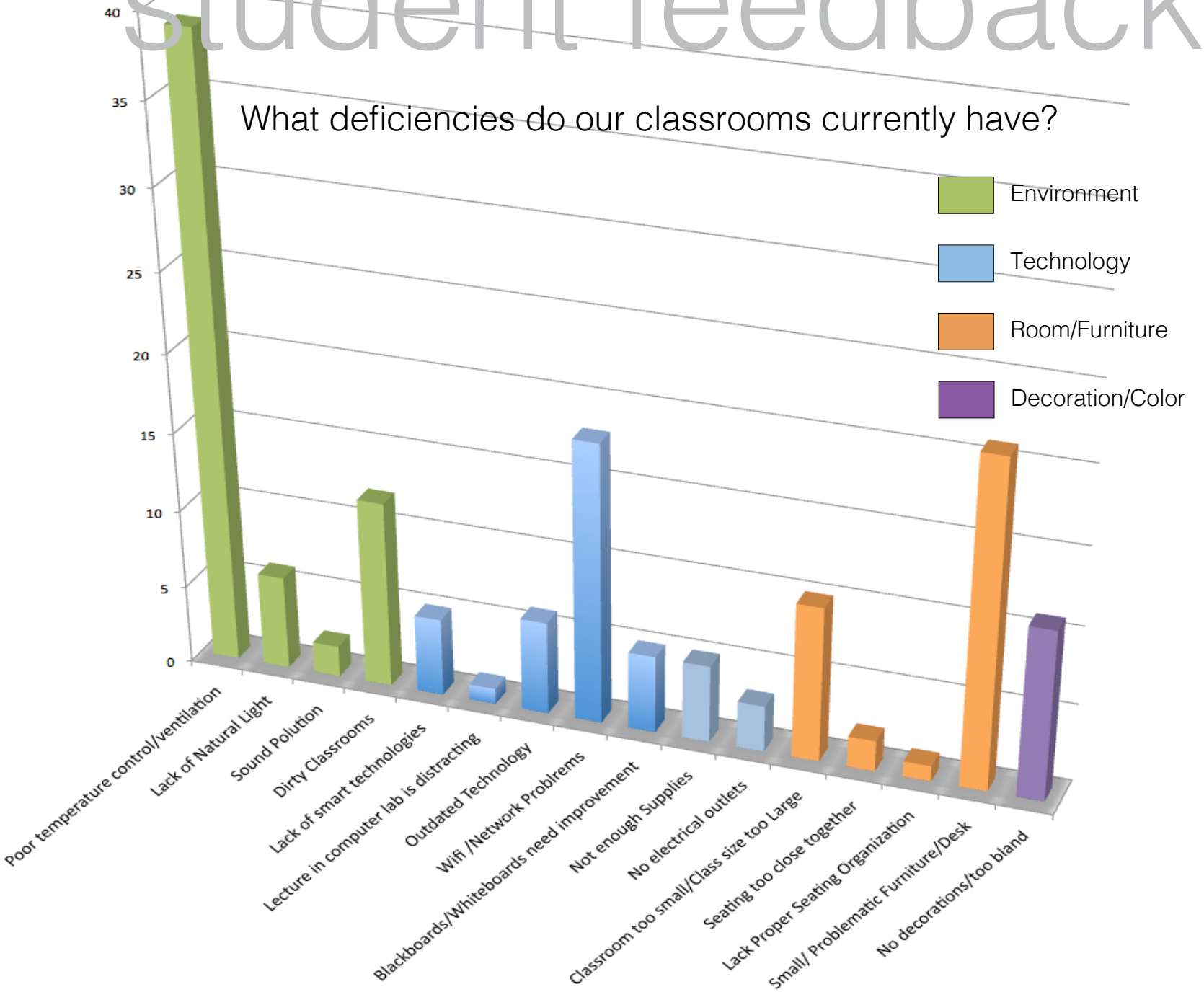
S1: All play a part in effective learning in short/small quantities.

S2: It depends on the subject, but I prefer discussion, a rounded conversation and having the ability to break off and work individually.

S3: Lecture and discussion are favorable because they facilitate learning about a topic and then collaboratively discussing it after. I hate group work!!!!!! People don't share the same work ethic when they're not getting paid.

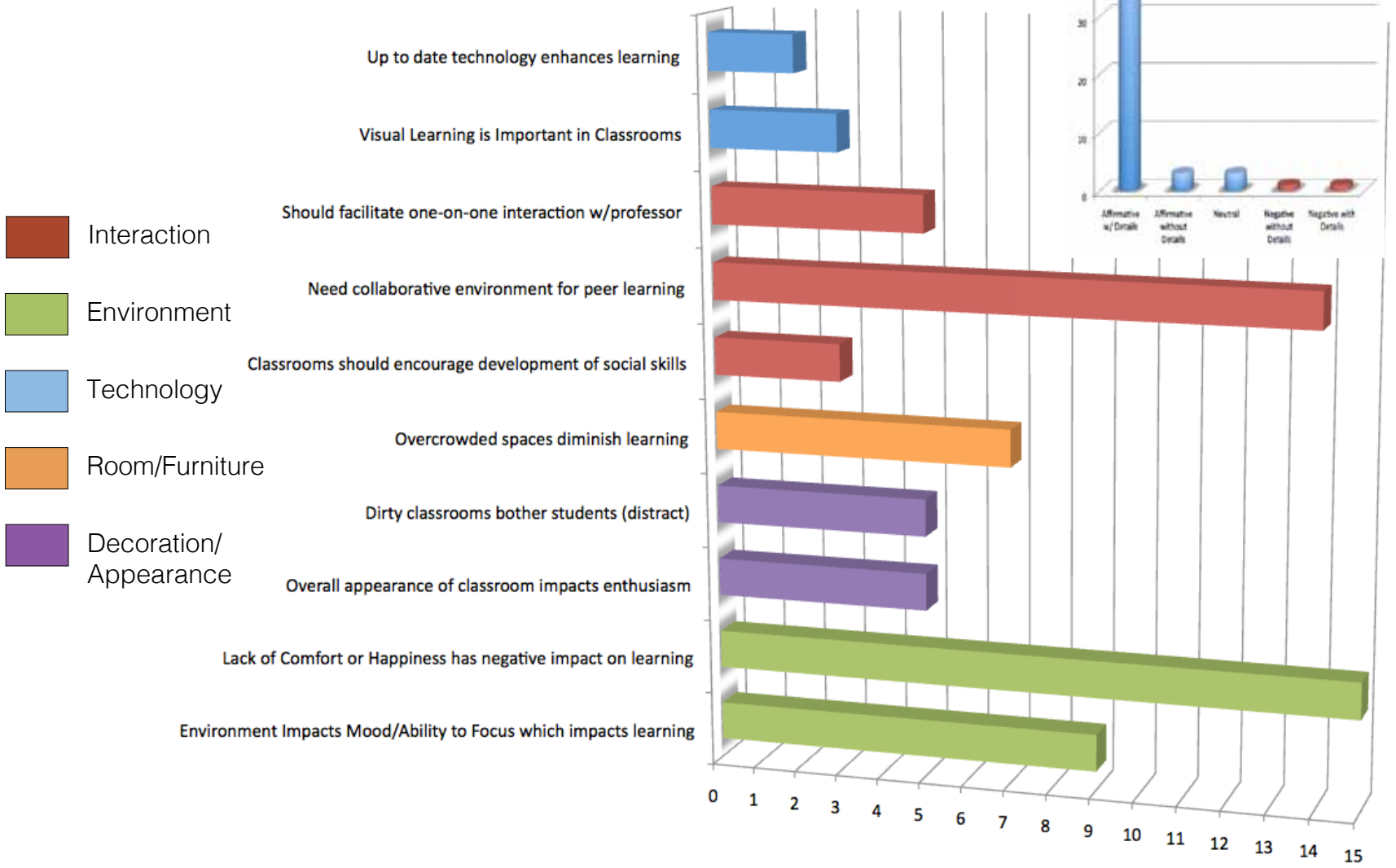
S4: As a creative learner, I believe class discussion to be most effective, because it gives students a chance to engage and have a diverse experience to different topics. Love: class discussion. Hate: lecture and group work.

student feedback

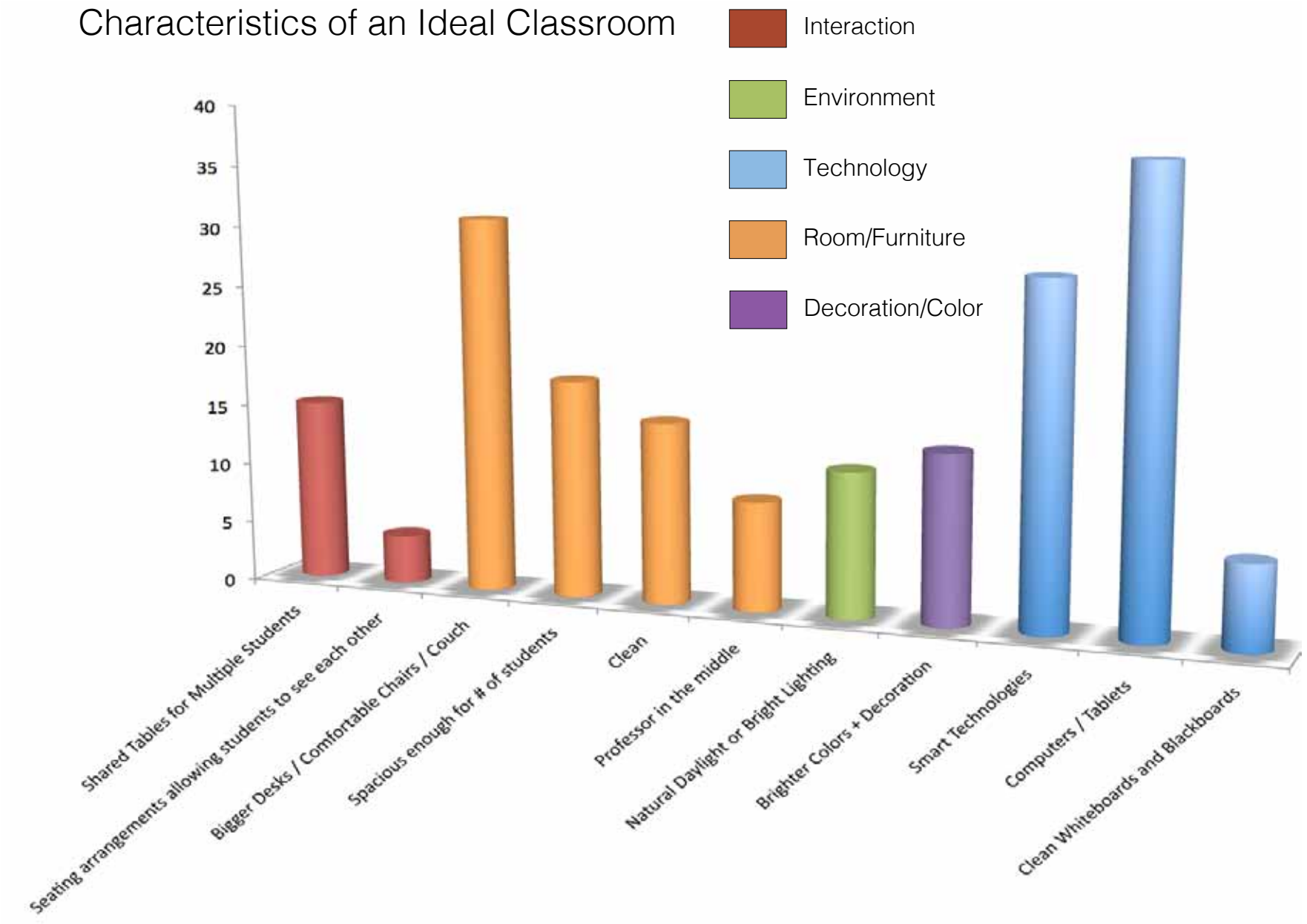


student feedback

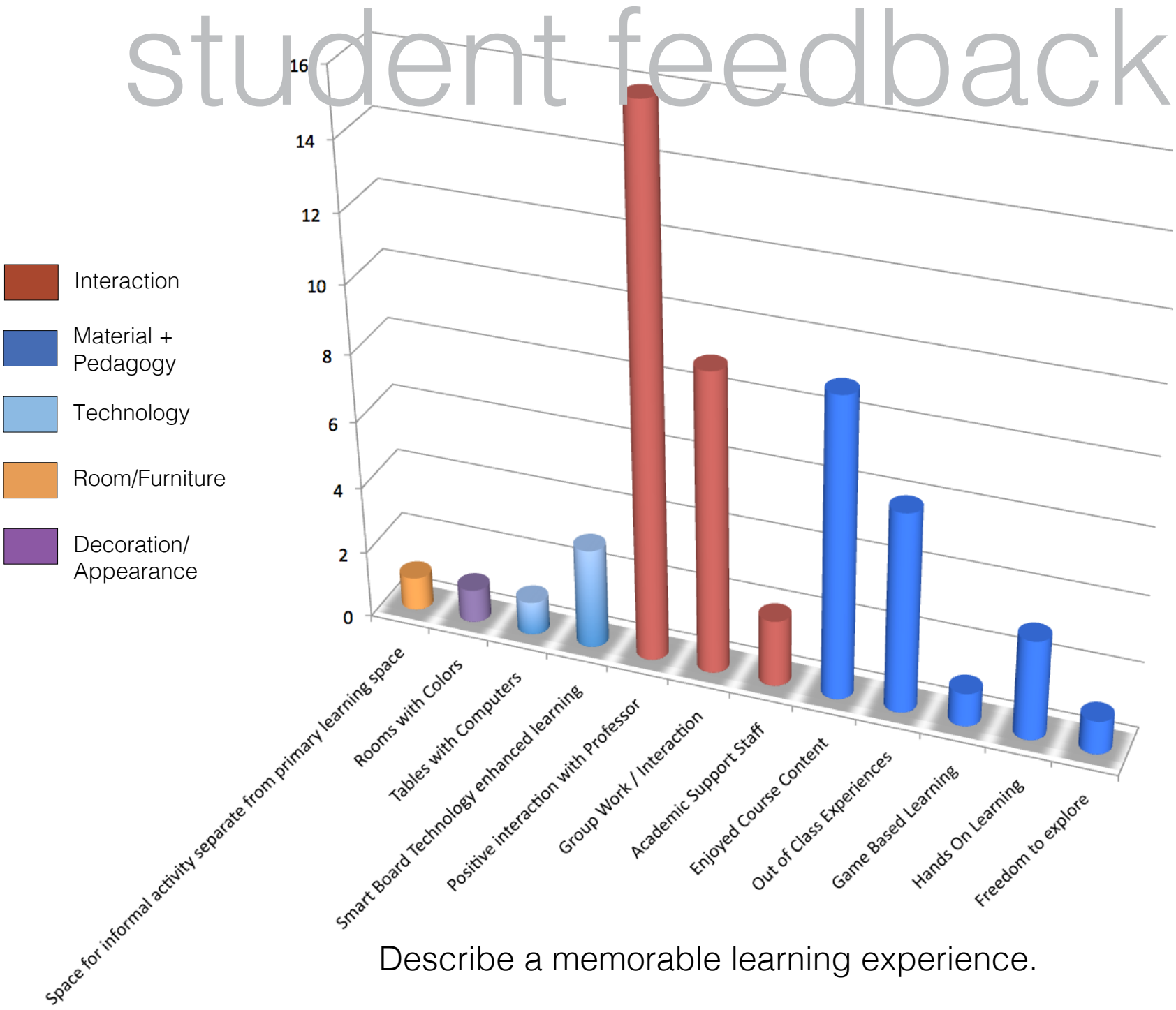
Do classrooms impact your learning? How?



student feedback



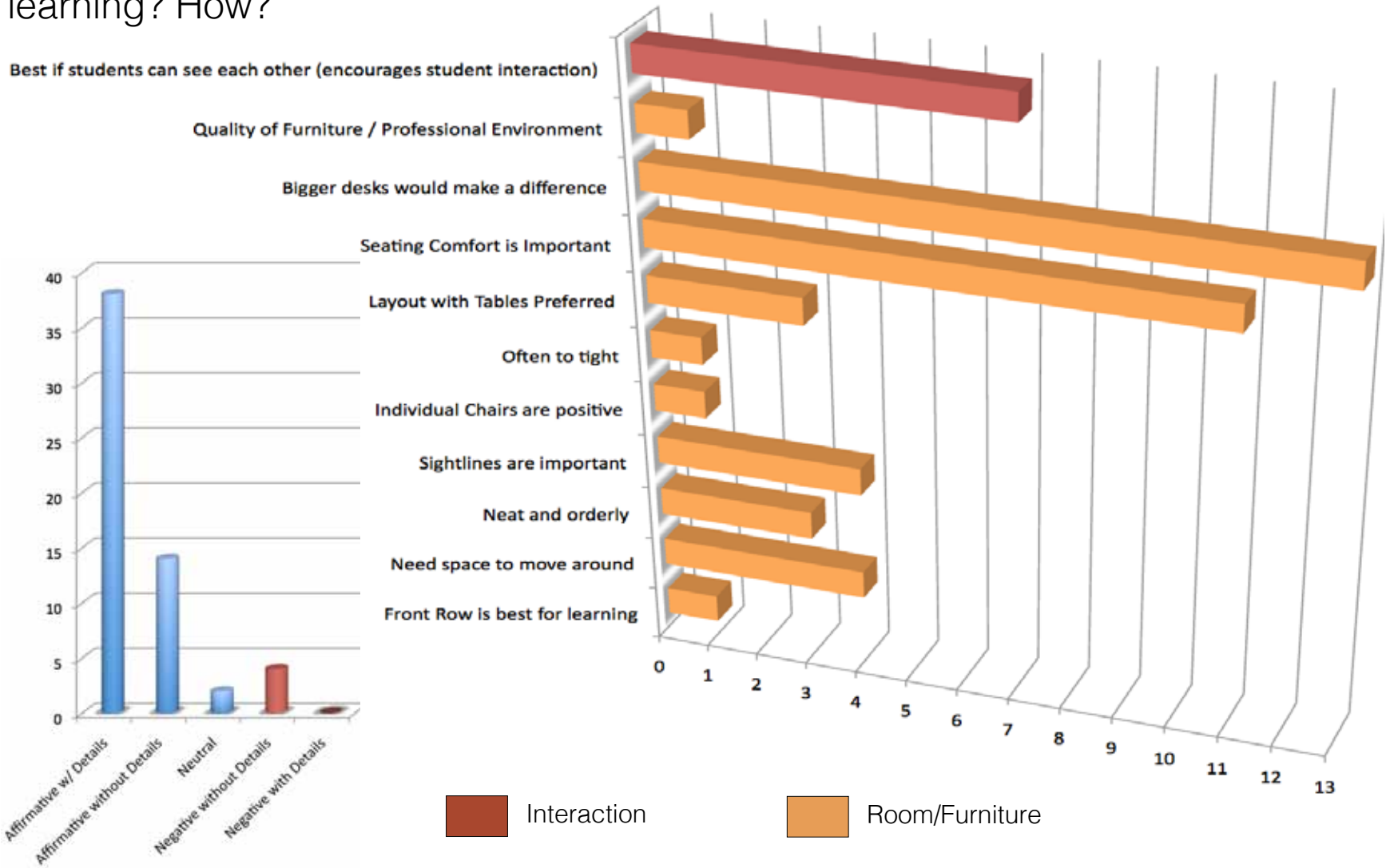
student feedback



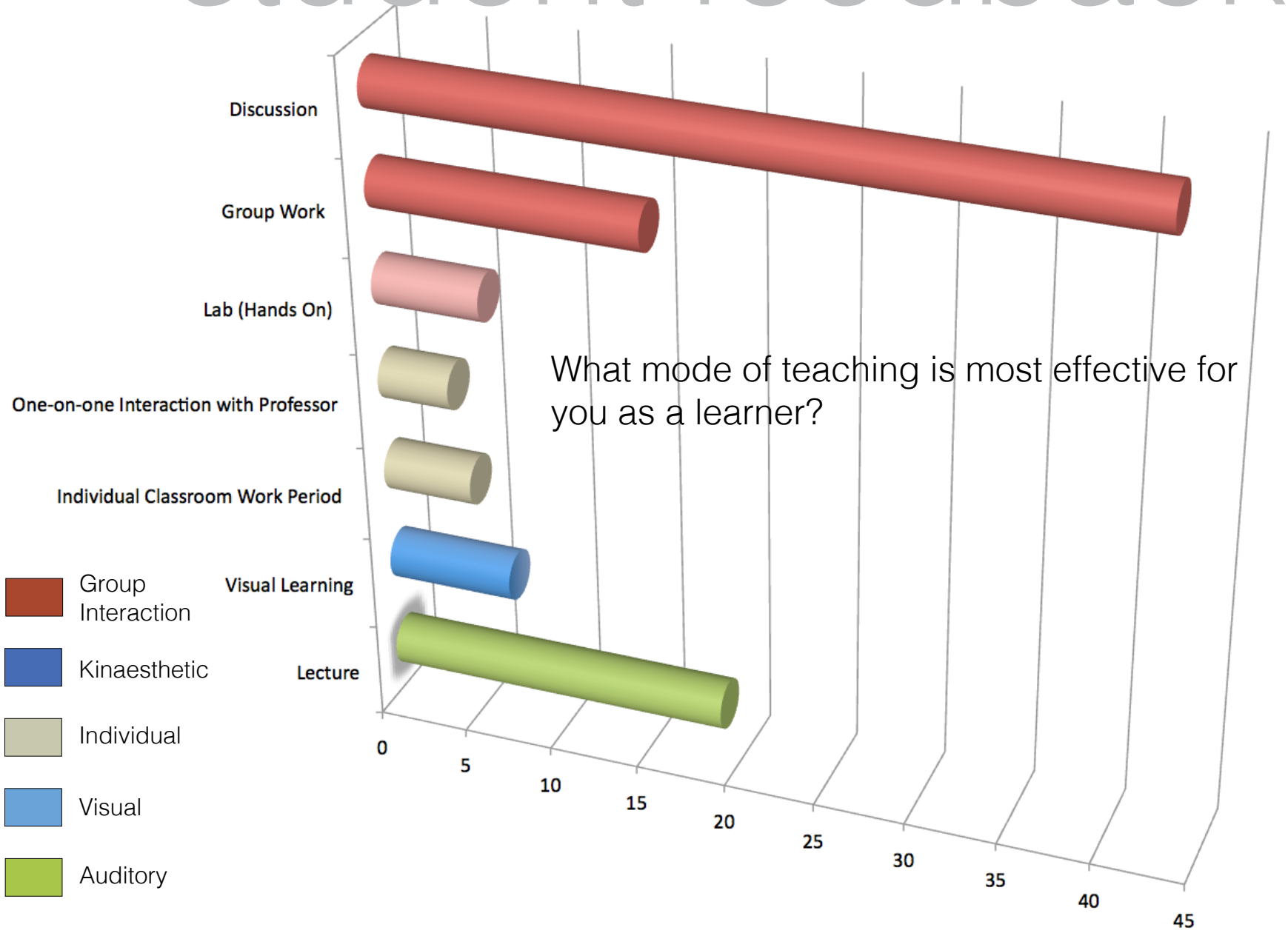
Describe a memorable learning experience.

student feedback

Does the furniture / layout make a difference to your learning? How?



student feedback



What mode of teaching is most effective for you as a learner?

faculty feedback

survey in development

faculty feedback

The Buildings and Grounds Committee is working on a survey to measure faculty views on classrooms and garner feedback on the active learning environment options presented in this report. This survey is being coordinated through the AIR office. The target date for the survey is Fall 2016. The intention of the committee is to seek consensus on a particular learning environment concept that can be developed into a pilot, built, and tested by faculty volunteers interested in active learning pedagogy.

Below are some examples of questions being considered for the survey:

6. How important are the modes of teaching listed below to your courses?

	Not important	Somewhat important	Important	Very important	N/A
Group Activities	○	○	○	○	○
Problem-based Learning	○	○	○	○	○
Seminar	○	○	○	○	○
Lecture	○	○	○	○	○
Peer Review	○	○	○	○	○
Discussion	○	○	○	○	○
Classroom Research	○	○	○	○	○
Collaborative Projects	○	○	○	○	○

faculty feedback

1. Rank in order of priority the changes you would make to enhance your classroom's physical environment towards improving student learning? (1 = highest priority)

- Add or enhance the provision of technology in the classroom
- Improve temperature control
- Improve lighting
- Repair existing problems
- Improve the acoustics and eliminate noise pollution
- Add electrical outlets
- Improve window operation
- Improve blinds for daylight control
- Reduce number of students assigned to a class to address overcrowding
- Improve aesthetic appearance of the room
- Improve cleanliness of room (windows, window sills for example)

faculty feedback

3. How important are changes or additions to the existing technology in the classroom towards improving student learning and skills development?

	Not Important	Somewhat important	Important	Very important	N/A
Add individual computer stations for all students	○	○	○	○	○
Add shared computer stations for working in groups along the walls of the classroom	○	○	○	○	○
Provide tablets with adequate wifi access	○	○	○	○	○
Add large flatscreen TVs for improved audio visual	○	○	○	○	○
Add additional projectors and screens as needed to improve student viewing	○	○	○	○	○
Provide smartboards	○	○	○	○	○
Upgrade projectors	○	○	○	○	○
Provide interactive technology (like clickers)	○	○	○	○	○
Provide wall to wall white boards	○	○	○	○	○
Provide wall to wall chalk boards	○	○	○	○	○

faculty feedback

7. How does your classroom currently facilitate group work?

	Inhibits group work	Makes group work challenging	Facilitates group work	Provides strong facility for group work
Existing Physical Space	○	○	○	○
Current Furniture	○	○	○	○
Current Technology	○	○	○	○
Number of Students	○	○	○	○

8. How likely would you use more varied modes of teaching (classroom research, discussion, group activity, seminar, lecture, collaborative projects, peer review, problem-based learning...) if the classroom facilitated them?

Not likely	Likely	Very likely	N/A
○	○	○	○

faculty feedback

9. In order of priority (1= highest priority), what needs to change in your classroom to allow you to apply multiple modes of teaching?

⋮⋮	Physical Space	N/A
⋮⋮	Furniture	N/A
⋮⋮	Technology	N/A
⋮⋮	Number of Students	N/A

10. How important is flexibility in the classroom layout to your teaching?

Not important	Somewhat important	Important	Very Important	N/A
○	○	○	○	○

next steps

pilot project

next steps

There are no more important spaces on any campus than the classrooms, the primary place of interaction and learning. This is especially true of a commuter college where students are on campus for a limited time each week.

This project seeks incremental improvement in our learning environment through the application of design principals and strategies rooted in scholarly research and best practices supported by data. Through the continued coordination by the Buildings and Grounds Committee of College Council, in combination with other committees on campus and in collaboration with the administration, small steps can be taken to implement these strategies on campus.

Once we are able to achieve a level of consensus on a pilot strategy, B&G and the administration can work together to define the appropriate budget and identify the space for the pilot. As the space is fitted out, interested faculty can be recruited to test drive the space. The courses taught in the pilot space will facilitate collection of data on the impact of the space on student learning outcomes, using existing classrooms as a control. This data then can be used to further refine the design concept and begin a process of implementing additional active learning environments on campus.

Another important next step is to establish a formal process of faculty and administrative collaboration and coordination of the design of future learning environments on campus. This report demonstrates the strong potential of this collaboration becoming a major focus of the work of the Buildings and Grounds Committee of College Council.

There are many factors that add context and complexity to this effort. It is easy to focus on smaller class sizes as a goal, for example, but space and resources are limited and there are many critical drivers that cannot be easily changed through this project. There will clearly be a distance between the ideal and the achievable. But many critical changes may be within reach, and this project hopes to guide our campus towards an increasingly impactful place of learning.