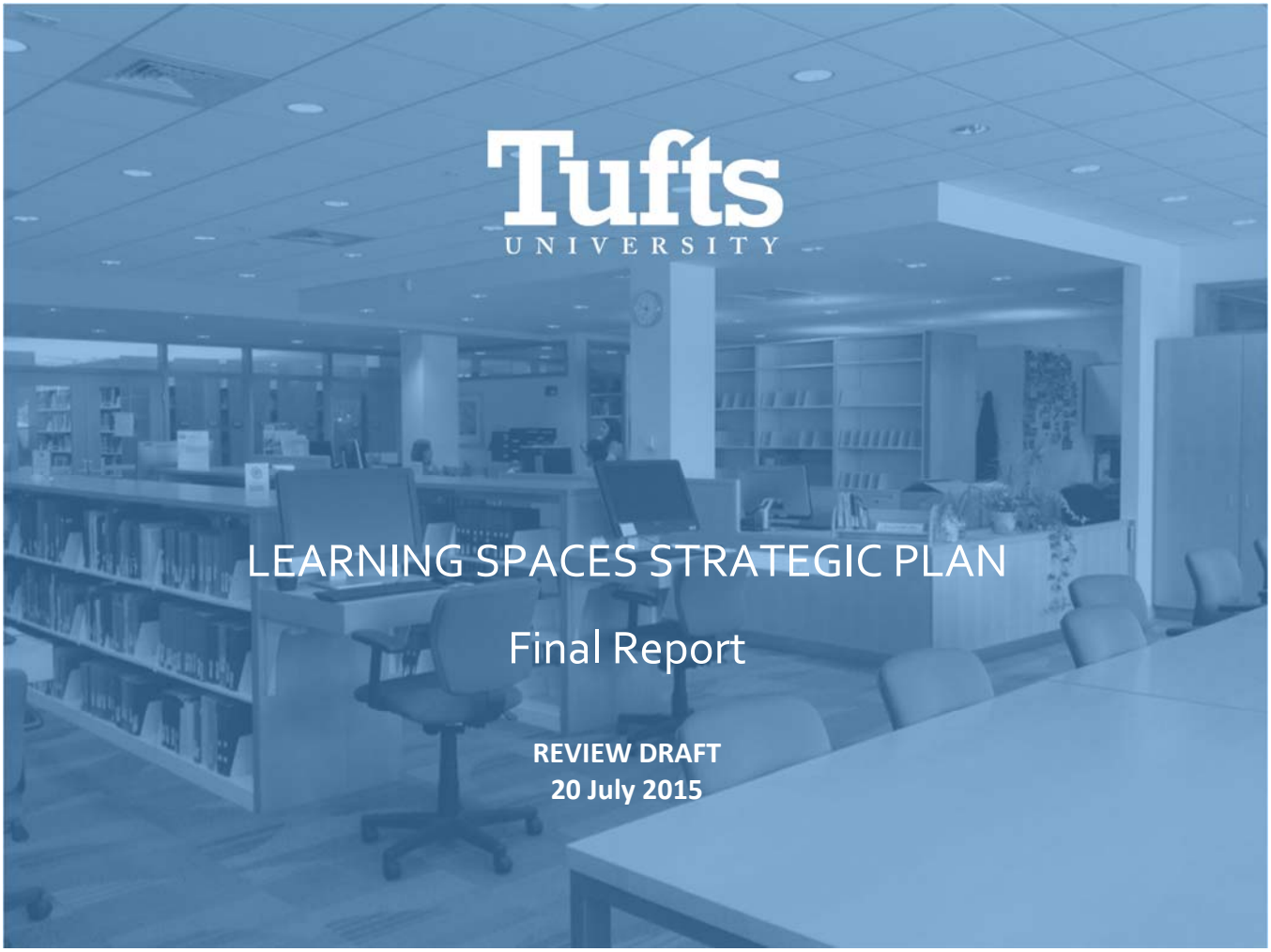

LEARNING SPACES STRATEGIC PLAN

Final Report

REVIEW DRAFT
20 July 2015

Biddison Hier, Ltd.
Consultants to Higher Education

Sasaki Associates
Architects

Contents

LEARNING SPACES STRATEGIC PLAN

Executive Summary

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EXECUTIVE SUMMARY

Tufts University engaged the team of Biddison Hier, Ltd., a Washington, DC-based resource planning firm specializing in working with institutions of higher education, and Sasaki Associates, a Boston-based architectural firm with an international portfolio of planning and design projects including a broad range of university assignments, to undertake a Learning Space Assessment for teaching and learning spaces on the Medford Campus.

The evaluation included the University's current inventory of learning spaces in order to better align their capacity with modern pedagogical approaches. Ultimately, the study examined 260 learning spaces including 195 regularly-scheduled rooms (55% Registrar, 45% non-registrar) and 65 informal learning spaces.

Study Elements

The study included five major areas of activity.

- **Learning space physical assessment.** A detailed physical inspection of all 260 rooms included in the study to record quantitative and qualitative information on physical, pedagogical, technological, environmental and other conditions.
- **Stakeholder market research.** Interviews, focus groups and surveys with faculty, staff and students to obtain their perspectives on current and anticipated pedagogies, current experiences in classrooms, issues and concerns, etc.
- **Space utilization assessment.** Quantitative analysis of room and seat utilization and other performance metrics associated with formal learning spaces (i.e., classrooms and conference rooms), some managed by the Registrar and others by departments.
- **Analysis of administrative and scheduling processes.** Review of operational and management issues and scheduling policies to identify "points of pain" and evaluate opportunities for improvement.
- **Recommendations for learning space improvements and associated cost estimates.** Evaluation of possibilities and identification of options for creating better alignments between learning spaces and 21st century teaching methods, and order-of-magnitude costs for doing so.

Key Study Findings

The research phase of the project identified several areas to focus on in developing the Learning Spaces Strategic Plan.

Misalignment of Inventory with Modern Pedagogical Approaches.

Many of Tufts' formal teaching spaces at Tufts are not well-suited to the types of teaching that faculty wish to do. According to the faculty survey, 80% of respondents have had to adapt their teaching styles to conform to their assigned classroom, and 55% said that the lack of a suitable teaching space hampered them from exploring new teaching methods.

In general, faculty seek more flexibility in and outside the classroom – e.g., being able to move furnishings around quickly to teach in different configurations; facilitating greater interactions among students; teaching from

someplace other than a podium at the front; having group study / breakout areas near classrooms; etc. Tablet arm chairs, which comprise more than 50% of the formal learning space inventory, are not well-suited to the range of pedagogies that faculty use and would like to use. Further, many of Tufts rooms are overfurnished with these chairs. The standard for modern flexible classroom spaces is typically 25 to 30 square feet per seat, but is often as low as 10 to 15 square feet per seat at Tufts.

Upgrades to Physical Conditions

Many of Tufts learning spaces were built long ago and are overdue for refreshing and modernization. Required renovations range from the basic (paint, carpet, improved lighting) to changes to improve functionality (e.g., repositioning boards or screens so that both can be used simultaneously, adding electrical outlets to accommodate widespread use of laptops and other devices). Conditions can vary from room to room and building to building, making the teaching experience very different depending on the space a class has been scheduled into.

Enrollments and Supply versus Demand

Class sizes at Tufts are overwhelmingly small (77% have 25 or fewer students), and there are some misalignments between room size and class size. The supply of rooms at the mid and upper ends of seat capacity (26 seats and above) far exceeds the number of sections that need rooms of that size.

Scheduling, Utilization and Scheduling Policies

Tufts' predominant scheduling patterns are two-day meetings on Monday-Wednesday or Tuesday-Thursday, and a wide range of one-day patterns. There are relatively few three-day patterns, and lower utilization on Fridays than other days. Nonetheless, the preponderance of Tufts' sections adhere to general schedule block time frames, which allows for reasonably efficient room scheduling.

In Registrar rooms, average utilization over the week is generally good – 46% over a 9.7 hour day, which compares favorably with benchmarks reviewed for the study. However, there is unused capacity in the morning hours. Further, Tufts has in place a policy that no more than 55% of a department's sections should be scheduled in "Prime Time" (10am to 3:50pm), but many departments do not adhere to this policy. Not all departments have the ability to schedule sections in their buildings, but for those that do, seven of the twelve largest departments schedule the preponderance of classes in their buildings – taking advantage of Tufts' "home court advantage" policy. This sometimes results in smaller sections being scheduled in rooms that are larger than necessary, simply because of the room's proximity to the department.

Scheduling data for non-Registrar rooms appears to be highly incomplete, as only formal classes that are held in these rooms are recorded in the Tufts scheduling database (EMS).

Process and Management Issues around Learning Spaces

Budgets. Funding for learning spaces, to the extent that it exists, is decentralized among several entities, and somewhat *ad hoc* from year to year, making it difficult to develop long-term plans for managing and upgrading learning spaces. There is need for better coordination of budgets to support learning spaces, as well as more consistent and reliable funding for technology, furnishings and other upgrades.

Pedagogy. Many entities (e.g., Centers, committees) exist to advance the state of the art in teaching, and to involve faculty in exploring new pedagogical approaches. New pedagogies have significant implications for furnishings, fit-out and technology in classrooms, but there is no easy way to make the link between research and development on evolving pedagogies and implementing change in classrooms.

Operational Aspects of Learning Spaces. Learning spaces at Tufts, as at many other institutions, are not organizationally under one single area of the University. Rather, different aspects of learning space (e.g., technology, furnishing, scheduling, maintenance and operations, etc.) are managed by different groups within the University, or in some cases not at all. Basic cleaning and maintenance, for example, are covered by the Office of Facilities, but there is no specific budget authority there or in any other office for furniture replacement. Technology is generally coordinated by Tufts Technology Services (TTS) but in some cases departments fund and manage their own technology. With no easy way to understand "the big picture" for learning spaces, some critical needs (e.g., overfurnishing of rooms; needs for upgrades and modernization, etc.) have not been addressed over the years.

Information. Information on learning spaces has been scattered and spotty. Until this study, Tufts did not have a reliable database of information on conditions in learning spaces. The study included a comprehensive assessment, in which information was collected on basic room conditions, both quantitative (e.g., number and type of seats, white and / or blackboards, screens, wireless access and other technologies, etc.) and qualitative (e.g., quality of spaces, environmental conditions, sight lines, etc.)

Study Recommendations

Supporting a high quality learning experience extends well beyond simple physical changes to classrooms. Recommendations are made in four key areas that have an impact on learning spaces.

1. **Strategy and Program [SP].** These are key principles that drive the planning and design of learning spaces, and the activities that occur within them.
2. **Physical and Technology [PT].** Proposed changes and upgrades.
3. **Scheduling [SC].** Policy changes to promote better use of learning spaces.
4. **Process and Management [PM].** Actions to improve the function and operation of learning spaces, and ongoing planning for them.

Strategy and Program Recommendations

These are key principles that drive the planning and design of learning spaces, and the activities that occur within them.

A. Defining Room Terminology to Align with Pedagogies

Learning spaces at Tufts have not kept pace with the evolution of new pedagogies that faculty use, which require a great deal of flexibility. The Plan recommends new language to describe requirements for learning spaces based on experiences in the classroom (e.g., spaces to accommodate interactive presentations, project-based classes with team activities, etc.), and the following general guiding principle:

> *When renovating existing or planning new learning spaces, make them flexible enough to support as many different pedagogical conditions as possible.*

B. Encouraging Faculty Participation in Innovation

Tufts has many initiatives to develop and enhance the teaching and learning experience. Some faculty – early adopters – already avail themselves of these initiatives, while others may require more encouragement. The Plan recommends the following:

- Develop more programs to help faculty develop best practices.
- Recruit support of the Deans to elevate the status of teaching enhancement programs.
- Build a faculty fellows program that adds prestige and incentives to the idea of developing and testing new modes of teaching.
- Develop a student component to existing initiatives in pedagogical innovation to ensure that an "end-user" perspective is included.

Physical and Technology Recommendations

These are specific proposed changes to existing conditions in learning spaces to upgrade and modernize them.

A. Creating Learning Spaces that can Accommodate a Wide Range of Pedagogies

Many of Tufts' classrooms fall well-below modern square footage standards (25 to 30 square feet per seat) and are "overfurnished" by modern norms. Also, more than 50% of Tufts' formal inventory is fit-out with tablet arm chairs, a furnishing type that is not well-suited to flexible learning styles. In response, the Plan recommends the following:

- "Rightsize the inventory" to meet modern square footage standards (by selectively reducing number of seats in rooms).
- Replace the preponderance of table arm chairs with movable tables and chairs to create more flexibility in accommodating modern pedagogies.

B. Achieving a Baseline Quality Level Across Learning Spaces

Tufts' learning spaces were created over long periods of time, with varying levels of upkeep and maintenance, and today there is a wide disparity in physical conditions and the ability to support modern pedagogies. The Plan recommends the following:

- Adopt a 5 year plan for renovations to bring Tufts learning spaces to baseline level of quality, and to make them better able to support modern pedagogies.

The recommendation proposes three levels of renovation (from minor to moderate renovation, plus new furnishings) and suggests specific rooms and buildings by level of priority. With modest renovations and refurnishing, Tufts can achieve great flexibility in the existing inventory to accommodate a wide range of pedagogies.

C. Transitioning from Presentation Technologies to Those that Support Student Participation, and

D. Provide Adequate Staffing for Technology

Tufts' classroom technologies are currently "front-of-room" focused, while modern pedagogies are more about the "flow" of the learning experience during a class meeting – e.g., from short lecture, to group work, to small group discussions to reporting out, etc. This calls for a different approach to classroom technology. The Plan recommends the following:

- Migrate from primarily hardware-based to software based technologies that provide greater flexibility for using technology in learning spaces (as they can be more easily paired with devices that students now bring to class), and that offer better options for technology upgrades and refresh cycles.
- Centralize technology expertise in the Tufts Technology Services organization and dedicate more resources to allow for sufficient staffing (internal and contract) to support new technologies.

E. Funding to Modernize and Refresh Learning Spaces

Proposed recommendations require a substantial commitment of funds for physical and technology changes. The Plan recommends the following:

- Allocate sufficient funding to invest in required physical and technology changes and upgrades over the next five years.

Funding requirements are in the range of $2 million to $3 million per year, or between $11 million and $13 million over five years.

Scheduling Recommendations

These are policy changes to promote better use of learning spaces.

A. Capturing Under-Used Scheduling Capacity in Registrar Rooms

Overall, Tufts does a relatively good job of using Registrar-managed rooms. Daytime room utilization is 46% over a fairly long day (9.7 hours), and compares favorably to peer benchmarks. However, there are pockets of under-used capacity that could be captured. The Plan recommends the following:

- Schedule more intensively in the 9:30am to10:20am schedule block, which is currently under-used.
- Enforce the "only 55% in Prime Time" scheduling policy more consistently. (This policy is designed to encourage scheduling courses across the full day, but a substantial number of departments do not currently follow the policy.)
- Limit the "home court advantage" to scheduling smaller learning spaces, with larger spaces (~60+ seats) fully schedulable by the Registrar and accessible to the entire University community. This will ensure that large courses get first priority in using the large rooms that they require.

B. Capturing More Complete Information on Scheduling and Use of Non-Registrar Rooms

Formal utilization of non-Registrar rooms is low (around 18% during daytime hours), but there are a host of activities that occur in the spaces that are not formally recorded. The Plan recommends the following:

- Include non-Registrar rooms – like Registrar rooms – in the EMS scheduling system, so that complete information on their use (for regularly-schedule and *ad hoc* events) is available.

Process and Management Recommendations

These are actions to improve the function and operation of learning spaces, and ongoing planning for them.

A. Ongoing Management of Learning Spaces

Recommendations in the Strategic Plan affect many facets of learning spaces – e.g., scheduling policies, modernization and upgrades to rooms, new approaches for technology fit-out and management, etc. To implement these effectively, management and oversight of learning spaces needs to be better coordinated on campus. The Plan recommends the following:

- Adopt a new framework for ongoing management of learning spaces that includes two new groups – a Learning Spaces Strategy Group and a Learning Spaces Working Group that have, respectively, strategic and operational oversight and responsibilities for learning spaces.

The Plan describes each group's roles fully and includes recommendations for representation and staffing of each group.

B. Implementing Improved Processes for Managing, Budgeting, Maintaining and Planning Learning Spaces

Certain aspects of operating and maintaining Tufts' learning spaces are decentralized, but would benefit from a greater degree of coordination. The Plan recommends the following:

- Combine all existing budgets related to learning spaces.
- Develop an integrated planning process and annual program plans for renovations and capital projects.
- Develop a single approach and standards for learning spaces maintenance and upkeep.
- Institutionalize ongoing learning space assessments.

The Plan includes detailed recommendations in each area.

LEARNING SPACES STRATEGIC PLAN

Detailed Report

REVIEW DRAFT
20 July 2015

Biddison Hier, Ltd.
Consultants to Higher Education

Sasaki Associates
Architects

DETAILED REPORT

Introduction

Learning is a fundamental part of scholarship at a university.

At Tufts, the exchange between faculty and students largely happens in learning spaces. Learning is augmented outside of these spaces through technology, of course, but as a residentially based university, *fundamental interactions take place in learning spaces*.

Accordingly, *spaces and activities that support learning should be highly valued* in the same way that research is – with *strong support for staffing, funding and encouragement of pedagogical innovations in the classrooms*.

Scope of the Learning Space Assessment Project

Recognizing the importance of teaching and learning spaces to its educational mission, Tufts University determined in Summer 2014 to undertake a study of learning space needs and conditions, with the goal of developing short and long-term plans to improve the quality, suitability, and management of a wide variety of learning spaces across the campus.

Elements of the study included: (1) analysis of existing conditions and (2) determination of current and future needs, with intended outcomes to include (a) strategies for near-term and long-term upgrades to existing learning spaces to accommodate current and future pedagogical requirements, and (b) recommendations for improved administrative processes associated with learning spaces.

The Project Team

Tufts University engaged the team of Biddison Hier, Ltd., a Washington, DC-based resource planning firm specializing in working with institutions of higher education, and Sasaki Associates, a Boston-based architectural firm with an international portfolio of planning and design projects including a broad range of university assignments, to undertake a Learning Space Assessment for teaching and learning spaces on the Medford Campus. The project was managed by Thomas Hier, principal of Biddison Hier, and Bryan Irwin, principal at Sasaki Associates. The team was assisted in technology matters by Dr. Andrew Milne, president of Tidebreak, Inc., a technology consulting firm based in Palo Alto, CA. Dr. Milne served as an independent consultant on the project.

Methodology for Development of the Strategic Plan

The Learning Space Assessment included six major tasks, as follows:

Task 1: Evaluate existing conditions of Tufts' learning spaces.

The Team developed a learning space *assessment tool* to record a wide range of characteristics of learning spaces such as room type, location, size, capacity, configuration, furniture type and layout, technology, and accessibility.

The Team physically inspected approximately 260 learning spaces over a period of about one week. Information was recorded in database format, to provide foundational information for the Team's work.[1]

Task 2: Survey stakeholders' learning space needs and preferences.

Stakeholder views on learning spaces were solicited through focus groups, interviews and a faculty / staff / student on-line survey. Interviews and focus groups explored views on formal learning spaces, informal teaching and learning spaces, pedagogical preferences, use of technology, etc. The campus survey included a geographically-based element (where respondents could express views about teaching, learning and other spaces based on campus locations), and a questionnaire to provide greater detail on needs and preferences. A total of 820 individuals responded to the survey, including 139 faculty, 107 staff and 574 students.

Task 3: Conduct a learning spaces utilization assessment.

A comprehensive classroom utilization analysis provided quantitative data on room and seat utilization, supply of and demand for Tufts' formal teaching spaces (195 of the total 260 spaces in the assessment), and other performance metrics. Utilization analyses included both Registrar and non-Registrar scheduled rooms, collectively and separately.

Task 4: Evaluate and identify improvements to learning spaces and provide cost estimates.

The Team used information and analyses from Tasks 1 through 3 to develop recommendations for near and long-term improvements to learning spaces. Particular focus was on identifying changes required so that learning spaces could support a wider variety of pedagogical styles going forward, and so that all rooms could achieve a baseline level of quality.

Tasks 5 and 6: Assess learning spaces scheduling processes and administrative processes for upgrading learning spaces.

Information gathered during interviews and focus groups included identification of policies and processes associated with scheduling and managing learning spaces, "points of pain" that were impeding effective use of spaces, and ideas about how changes to processes, policies and organizational structure might help to improve learning spaces.

[1] See Appendix 1 for a copy of the audit instrument.

Structure of the Learning Spaces Strategic Plan

Following this introduction, the substantive sections of the Strategic Plan are presented in two parts, as described below.

Part 1: Context for the Learning Spaces Strategic Plan

Part 1 sets the stage for the recommendations of the Strategic Plan by enumerating existing conditions and issues that affect planning for the future. Findings in these areas are derived from a review of existing conditions as well as information gleaned from interviews and focus groups. Areas covered include:

- Profile and Assessment of Learning Spaces
  - Profile-in-Brief of the Learning Space Inventory
  - Physical Assessment of the Inventory
- Stakeholder Views and Preferences Regarding Learning Spaces
  - Pedagogies
  - Feature Preferences for Learning Spaces
  - Informal Teaching and Learning Spaces
  - Pathways
- Utilization of Learning Spaces
  - Profile of the Regularly-Scheduled Room Inventory
  - Profile of Instruction
  - Scheduling Patterns and Policies
  - Performance Metrics and Analyses
- Process and Management Issues
  - Budgeting and Funding
  - Pedagogy
  - Technology
  - Room Management
  - Planning
- Summary of Key Issues

Part 2: The Learning Space Assessment Strategic Plan

Part 2 is the Strategic Plan itself, and is organized as follows:

- Introduction *(Overview of recommendations)*
- Guiding Principles *(Concepts that reflect philosophical underpinnings for the use and management of learning spaces)*
- Strategy and Program Recommendations *(Key principles that drive the planning and design of learning spaces, and activities that occur within them)*
- Physical and Technology Recommendations (*Proposed changes and upgrades*)
- Scheduling Recommendations (*Policy changes to promote better use of learning spaces*)
- Process and Management Recommendations *(Actions to improve the function and operation of learning spaces, and ongoing planning for them)*

Part 1
Context for the Learning Spaces Strategic Plan

Section 1.1: Overview of the Tufts Learning Spaces Inventory

Section 1.1.A.
Profile and Assessment of Learning Spaces

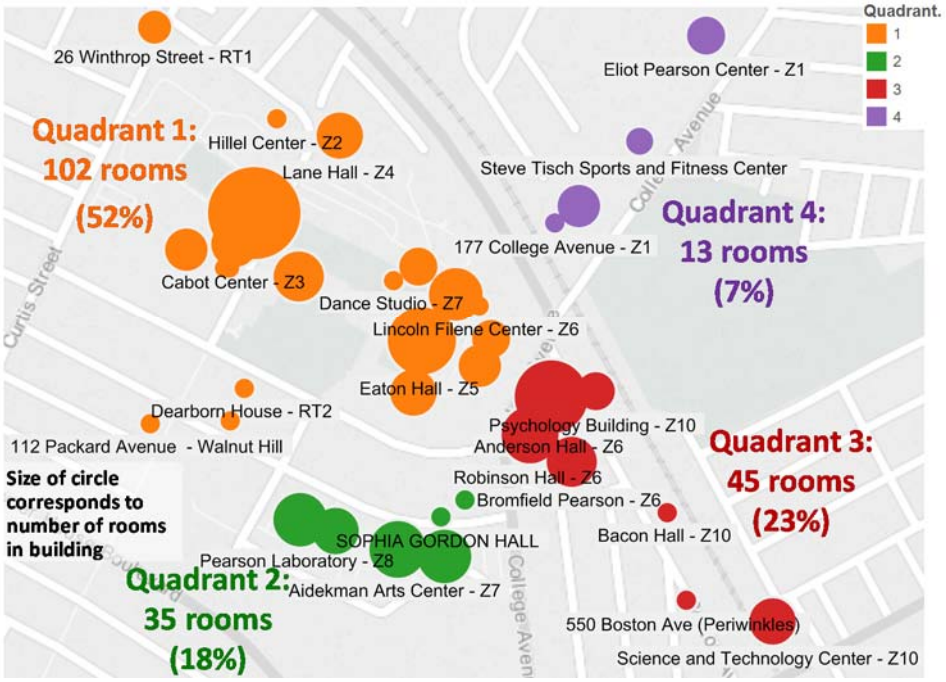
Profile-in-Brief of the Learning Space Inventory

For purposes of this study, "learning spaces" were defined to include formal and informal spaces that can be used for some type of teaching or learning activity – including general purpose classrooms, class labs, conference and meeting rooms, and assembly spaces. A total of 260 learning spaces were part of the study. Of these, 195 rooms are formally-scheduled spaces – meaning that courses are scheduled in them on a regular basis, and information on scheduling is recorded in some fashion. The remaining 65 spaces are termed "informal learning spaces" and are used on an *ad hoc* basis – e.g., to hold a study group, provide a group work space, etc.

About 50% of spaces are on the main campus northwest of College Avenue (*Quadrant 1* in the *Map 1* below). Just under 25% are in the triangle bounded by College Avenue, Warner Avenue and Boston Avenue (with a few further south on Boston Avenue) *(Quadrant 3)*. There is a concentration of rooms (~20%) along Talbot Avenue *(Quadrant 2)*; and the remainder (less than 10%) are along College Avenue east of Boston Avenue *(Quadrant 4)*.

Map 1.

Location on Campus by Quadrant



Learning spaces are distributed among 40 buildings and, as *Chart 1* shows, about two-thirds of these rooms are in just 13 buildings.

Chart 1.

Top 2/3 of Buildings by Room Count

Building	Rooms		
	No.	*Pct.*	*Cumul Pct.*
1 Olin Center - Z3	24	12%	12%
2 Anderson Hall - Z6	15	8%	20%
3 Eaton Hall - Z5	13	7%	27%
4 Aidekman Arts Center - Z7	11	6%	32%
5 Robinson Hall - Z6	9	5%	37%
6 Pearson Laboratory - Z8	8	4%	41%
7 Braker Hall - Z6	8	4%	45%
8 Granoff Music Center	8	4%	49%
9 Bromfield Pearson - Z6	7	4%	53%
10 Barnum Hall - Z5	7	4%	56%
11 Tisch Library - Z6	7	4%	60%
12 Science and Technology Center - Z1	7	4%	64%
13 Cabot Center - Z3	6	3%	67%
All 27 Other Buildings	65	33%	100%

Physical Assessment of the Inventory

At the project outset, the Project Team conducted a detailed review of all 260 learning spaces. For the review, the Team developed, in consultation with Tufts, an assessment tool to record findings in four key areas of assessment:

- Location and identification
- Environmental quality
- Layout and furnishings
- Tools and technology.

Within each category, some elements evaluated were purely quantitative (e.g., the number of wireless access points in a room), while others required more subjective judgment on the part of the assessors (e.g., condition of furnishings). Even the qualitative factors were rated using a consistent scale from room to room so that these ratings can provide a comparative view of conditions among the inventory. The assessment tool and a detailed report of findings are presented in *Appendices 1 and 2*. Highlights of finding are summarized below.

Location and Identification

Most learning spaces are easily identifiable and conveniently located close to campus activity centers. Of the spaces that are difficult to locate, primary reasons are either because the space is far from the center of campus, or in a remote, hidden location within a building.

Environmental Quality

Natural light is highly-prized in learning space settings. Many of Tufts' learning spaces have ample access to daylight and good views, but lack sufficient control of daylight. Artificial lighting in rooms is generally good, although controls and switching vary widely from room to room. Seating arrangements are the main cause of obstructed views, not architectural features (i.e. columns or walls).

Layout and Furnishings

Most room proportions are well-suited (e.g., wider rather than deeper) for learning spaces. However, over 75% of flexible classrooms have seating densities of 20 SF per seat or less, with almost half having densities of 15 SF per seat or less. These densities correlate to the overall difficulty for students, faculty, and furniture to move easily throughout the entire space. About 2/3 of rooms were judged somewhat or very difficult to move through, and furnishings in one-third were either fixed or determined to be very difficult to move. There is a high proportion of tablet arm chairs – ~55% of formal learning spaces (classrooms and conference rooms).

Projection screens block writing surfaces in over 75% of learning spaces, with very little if any writing space available in over 25% of spaces. Half of the spaces on campus have the potential for at least a small breakout area for informal learning close by.

Tools and Technology

The vast majority of spaces have a clearly identifiable primary teaching wall, with some having secondary writing surfaces on other walls, often times blocked by seating. Over 25% of spaces surveyed do not have integrated audio/visual systems.

The quantity and location of electrical outlets in learning spaces does not meet the needs of current technology – 75% of rooms have minimal electrical outlets, and of these, 2/3 are in inconvenient locations. Wireless access points (WAPs) can be found in almost all learning spaces, with a good correlation between capacity of room and number of WAPs.

Section 1.1.B.
Stakeholder Views and Preferences Regarding Learning Spaces

Pedagogies

Pedagogies drive the nature of teaching and learning spaces. In the latter part of the last century, pedagogies tended to be a mix of lecture, seminar or discussion and perhaps a few other formats. Teaching styles have evolved considerably in the past couple of decades, spurred in part by the advent of new technologies that allow for more flexibility in learning modes.

In interviews, focus groups and surveys, faculty (and students) described new modes of learning, and identified mismatches between current learning spaces and new pedagogies. A survey of faculty indicates that they use four teaching methods about equally (about 2/3 of respondents use each):

- collaborative learning
- lecture
- traditional class, and
- seminar.

More than half of faculty (55%) report that the lack of a suitable teaching space hampered them from exploring new teaching methods. Further, 80% have had to adapt their teaching styles to conform to the classroom assigned. The overwhelming sentiment from faculty was lack of flexibility to support multiple pedagogies within the same room. Some specific comments provide insight into mismatches between room configurations and teaching styles:

- **Fit.** Some rooms are cramped with too much seating, making anything other than straight lecturing virtually impossible. In other cases, immovable chairs constrict options.
- **Flexibility.** These is need for reconfigurable spaces where one can easily switch between lecture, breakout, and large discussion. There is also need for large lecture formats that feel intimate despite their size, and that allow for quick movement from whole group discussions to small groups.
- **Technology.** Some faculty would use multi-media resources in all pedagogical activities, but more than a few rooms lack even a computer in the room.
- **Interactivity.** There are not enough configurations that support students talking to each other; not enough space for different groups of students to write on boards at the same time, present ideas; etc. Some faculty would prefer to be in the middle of the room rather than at a lectern in front, so as to be able to guide discussions and interact easily with students, but most rooms do not support this.

Preferred Class Size

Faculty generally prefer small class sizes, even for lectures. Survey responses indicate the following class size preferences by pedagogy:

- **Seminars:** 10 to 16 students.
- **Collaborative & Project Based Learning:** 10 to 16 or 20 to 30.
- **Lectures:** almost one-half of faculty respondents prefer relatively small class sizes (20 to 30 students).

Faculty Priorities in Choosing a Classroom

In choosing a teaching space, faculty give highest priority to (1) size and layout of room then (2) equipment, (3) time of day, and (4) day of week. Faculty indicate that they are generally successful in getting room attributes, configuration and size that they request, but somewhat less successful in obtaining a specific room requested.

Feature Preferences for Learning Spaces

Overall, faculty rate effectiveness of Tufts' classrooms as teaching and learning spaces at about average, but give a less than average rating for the quality level and condition especially when considering the quality and reputation of Tufts as an institution. Staff and particularly students have somewhat more favorable views.

Features of greatest importance to faculty are (1) **technology equipment**; (2) **size, layout and "fit"** of room; and (3) **sight lines**. Students place a priority on fit, size and layout, but also cite **HVAC** and **room furnishings** as highly important. For the room they teach in most, faculty are most satisfied with the geographic location and least satisfied with match of room layout to pedagogy, and non-technology equipment.

What Makes a Good Learning Space?

Faculty and students prefer rooms that have natural light, as well as good artificial light. Rooms with a "shallow orientation" (board is on the longer wall, with no student too far from the front of the room) allow for good sightlines, a more intimate feel and better connection between faculty and students – they can see each other more easily.

Flexible furnishings allow the room to be configured to fit multiple pedagogies and different faculty needs; moveable tables and chairs are preferred over moveable tablet arm chairs. Good and copious amounts of board space not blocked by a projector also contributes to a room's desirability (ideally with writing surfaces on several walls).

Other important features include: good acoustics, adequate and reliable wireless connections, no-hassle technology ("plug and play"), and good lighting controls.

Finally, aesthetics are important, as they convey respect for teaching and learning. Well-appointed classrooms that are kept clean boost student and faculty morale and help in recruitment.

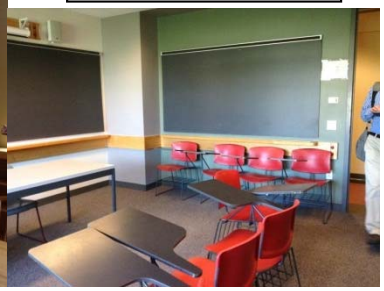
Goddard Hall

Bromfield - Pearson

Shallow, Intimate Feel

Natural Light, Adequate Space, Good Board Space

Olin Center



Board and Screen on Separate Walls

What are Problems in Learning Spaces?

Problematic rooms are everything that good rooms are not. They are characterized by a lack of natural light coupled with poor or depressing artificial light. Furnishings are inflexible and do not allow faculty to vary teaching techniques. These rooms are often "overfurnished" making movement within the room difficult. Poor sight lines, insufficient writing surfaces, and overall configurations that inhibit interactions all lead to less desirable learning spaces.

Tisch Viewing Room

Too Dim, Artificial Light

Anderson Hall

"Overfurnished"

Furnishing and Configuration Preferences

Seminar rooms
Faculty and students all prefer moveable tables and chairs or conference table and chairs substantially over tablet arm chairs in seminar rooms.

General purpose rooms
In general purpose rooms, faculty prefer moveable tables and chairs and flat floors. Students prefer tablet arm chairs and tiered floors.

Lecture halls
There is a strong preference for fixed chairs with table arms and tiered floors.

Writing Surfaces

Faculty preferences are evenly split between a blackboard and whiteboard. Almost 2/3 of students (~60%) prefer whiteboards. There is little interest among either group for Smartboards.

Instructor Station

Faculty survey respondents prefer a table over other instruction station options by more than 2 to 1. Fixed podium configurations – e.g., in some Fletcher classrooms – interrupt sight lines, and create a feeling of a barrier between faculty and students. For collaborative / interactive activities, some faculty prefer a station in the middle of the room rather than at the front or off to the side.

Classroom Furnishings

The current dominance of movable tablet arm chairs make classrooms not well suited to the range of pedagogical approaches that faculty employ now – including: small group learning, breakout sessions, active learning, etc.

Flexible Classroom Spaces

The modern standard for flexible classroom spaces typically allocates 25-30 square feet per seat; however this value is often as low as 10-15 square feet per seat at Tufts.

Technology

Generally, faculty report that they are able to use and manage technology easily in learning spaces, although there are some difficulties in troubleshooting problems and obtaining tech support in a timely fashion. At this time, faculty report high usage of data projectors, Internet / WEB connectivity, and instructor station computer. About two-thirds of faculty report that they prefer to bring their own laptop to class. In part, this stems from problems that faculty have had in using technology in the room, and in part from a lack of having a Tufts-provided laptop available in the room.

Video Capture and Digital Display

If video recording capability existed and was easy to use, only 11% would record every class. About 44% of faculty respondents would record only the occasional class, and about 30% would never record. On the other hand, students in focus groups noted a real benefit in being able to review recorded classes after-the-fact when there was something they didn't understand in class; and prior to mid-terms and finals.

Each student was asked to identify the percent of her / his courses that made use of digital displays. Half of respondents indicate that at least 75% of their courses currently use digital display. For 20% of respondents, digital display was used in every course.

Use of Student Laptops in Class

Almost 75% of faculty respondents leave it up to students as to whether they can use a laptop in class. Students report that about 40% use laptops for some classes, depending on the nature and content of the class. About half of student respondents, however, prefer to take notes by hand rather than on a laptop for various reasons, e.g., laptops can be too easily distracting in class, and some find that note-taking by hand is better since writing forces one to process information more carefully, make judgments about what's important, and ultimately requires paying closer attention to what is being said in class.

Informal Teaching and Learning Spaces

Group and Collaborative Venues

There is strong interest among faculty and students for adding spaces to facilitate collaboration and group work near teaching spaces. Top priority for faculty are **whiteboards** and **group study / breakout rooms near classrooms**. For students, priorities are group study rooms then **soft seating** and white / blackboards.

About one-half of students and one-third of faculty respondents express interest in breakout spaces outside of class that would be used during class time. In focus groups, faculty expressed greater interest in flexibility *inside* the classroom, to be able to move into small groups quickly. The only exception is for classes involving negotiation (e.g., in Fletcher), where it is important that groups cannot hear each other in discussions.

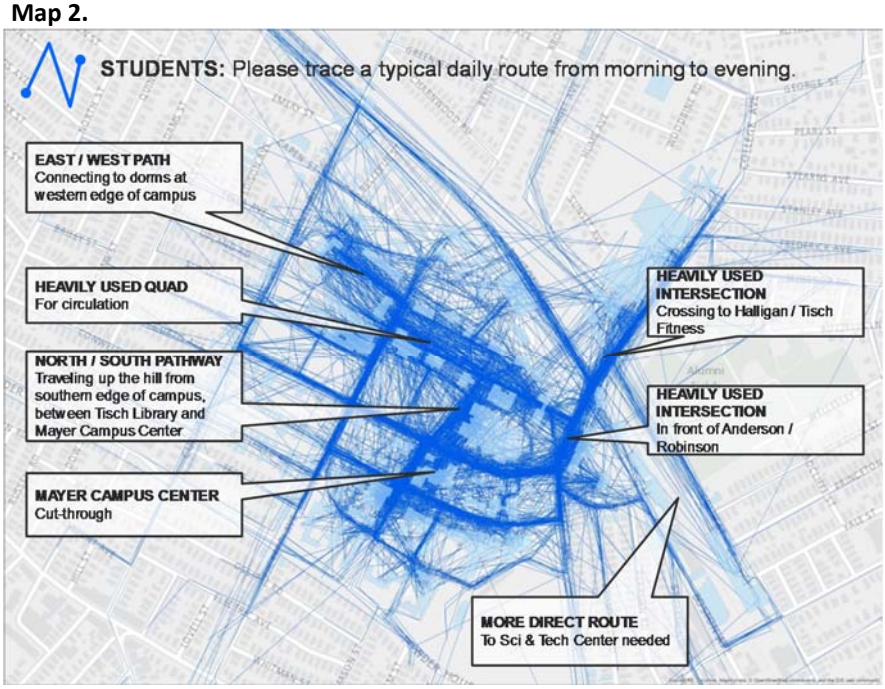
Study Venues

The preponderance of student respondents appear to study alone more than in groups, by a significant amount. (80% study at least 60% of their time alone.) The preponderance of students study at home or in the library in a group study room or reading room. Coffee houses – on or off-campus – were least preferred.

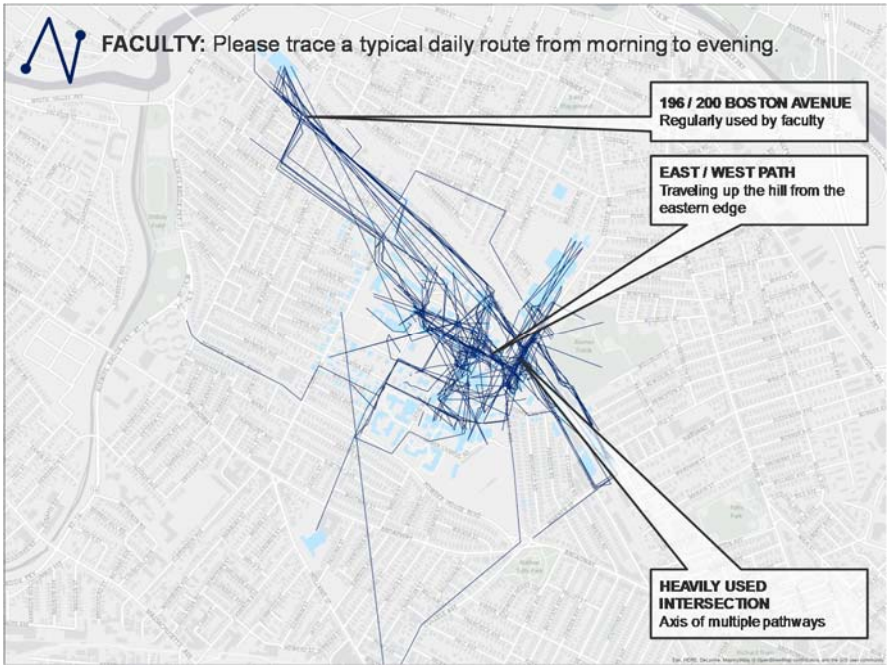
Pathways

As part of the campus survey, respondents were asked to trace their normal traffic patterns during a typical weekday, which provides some insight regarding concentrations of activity on campus. As would be expected, the main quad is the most heavily trafficked area. But there is also heavy traffic along Professors' Row and Talbot Avenue to the south, and up College Avenue to the northwest. Although distances are not great, the hilly terrain can be challenging for moving quickly between different parts of campus, which in some cases has been addressed by offering departments "home court advantage" in scheduling classes – i.e., they get first choice on learning spaces located in buildings where their departmental offices are. *Maps 2 and 3* below illustrate, respectively, student and faculty pathways.

Map 2.



Map 3.



Section 1.1.C.
Utilization of Learning Spaces

Profile of the Regularly-Scheduled Room Inventory

Types of Formal Learning Spaces

Of the 260 spaces included in the assessment, 195 spaces are formally and regularly scheduled – that is, they have traditional classroom-based activities that occur regularly from week to week. About two-thirds are classified as classrooms (versus more specialized teaching spaces), as *Chart 2* shows.

Chart 2.

FICM (Room Use) Code	Registar	Non-Registrar	Total	
	No.	*No.*	*No.*	*Pct.*
110 - Classroom	100	26	126	65%
210 - Class Laboratory	2	29	31	16%
220 - Open Laboratory	3	4	7	4%
350 - Conference Room	3	13	16	8%
610 - Assembly	0	8	8	4%
680 - Meeting Room	0	4	4	2%
420 - Stack	0	1	1	1%
520 - Athletic Physical Edu	0	1	1	1%
523 - Athletics Facilities Specl	0	1	1	1%
Total	**108**	**87**	**195**	**100%**

Schedulers of Learning Spaces

Of these 195 learning spaces, about 75% (108 rooms) are scheduled by the Registrar and 25% (87 rooms) by individual departments or other units at Tufts. The distinction is important because only Registrar rooms have complete data on when these rooms are scheduled. *Map 4* below shows how Registrar vs. departmentally scheduled rooms are distributed by building (blue for Registrar, orange for non-Registrar). Departments schedule the preponderance of the smallest rooms (1-15 seats), while the Registrar schedules the majority in every other room size, except the largest where the split is 50/50. (See *Chart 3*.)

Map 4.

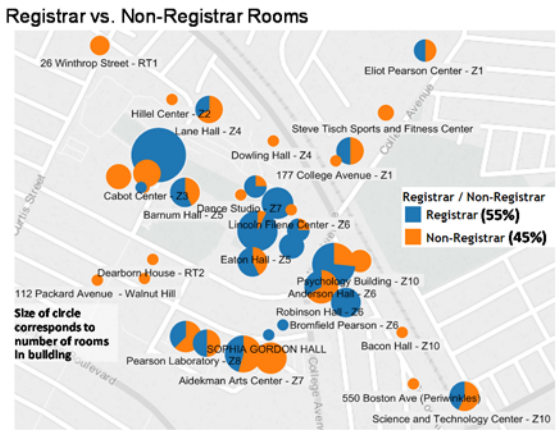
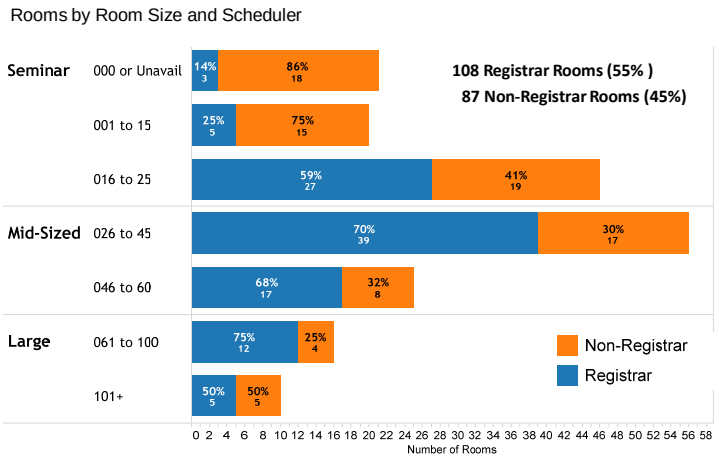


Chart 3.

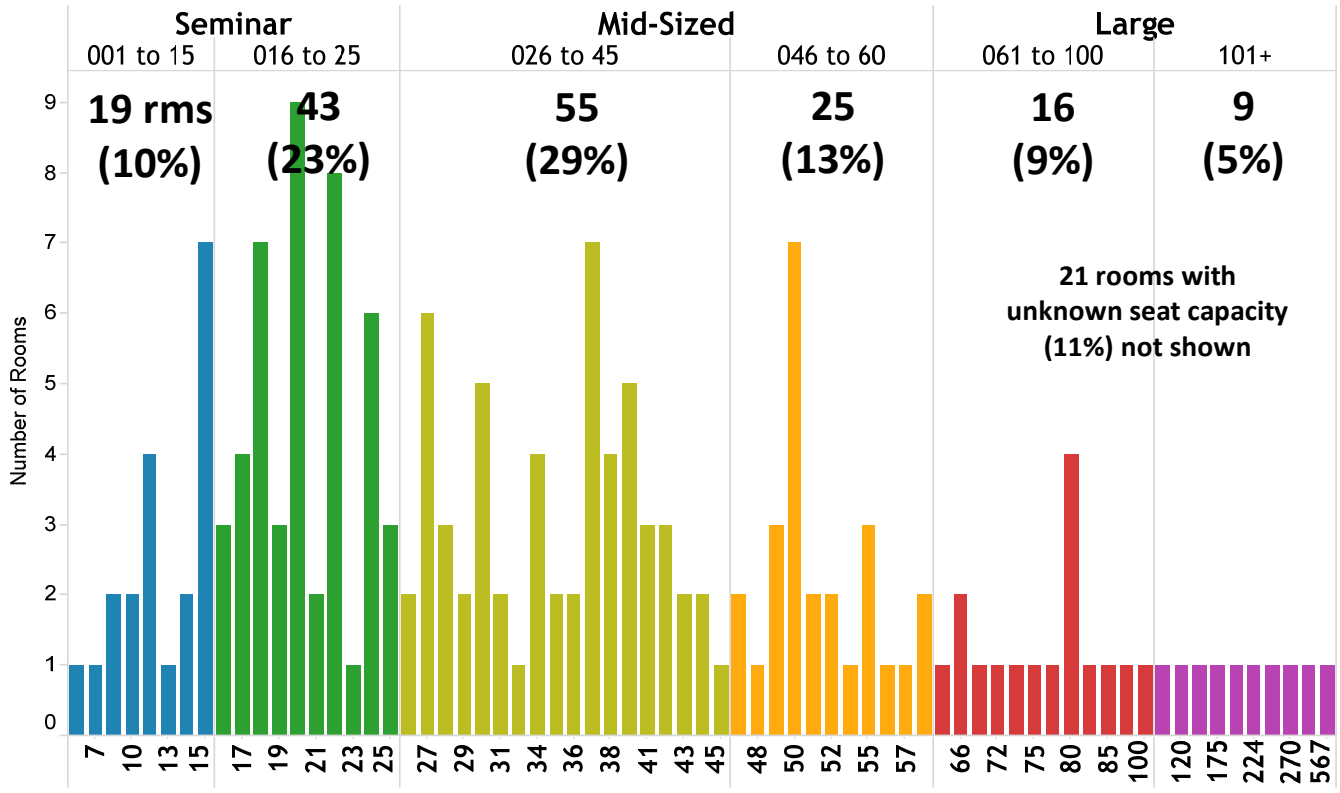


Distribution of Rooms by Seat Capacity

The preponderance of the inventory (51%) is either seminar rooms (1 to 25 seats), or mid-sized rooms (26 to 45 seats. (See *Chart 4*.) About 10% of the inventory is in very small rooms (<15 seats).

Chart 4.

Distribution of Rooms by Size



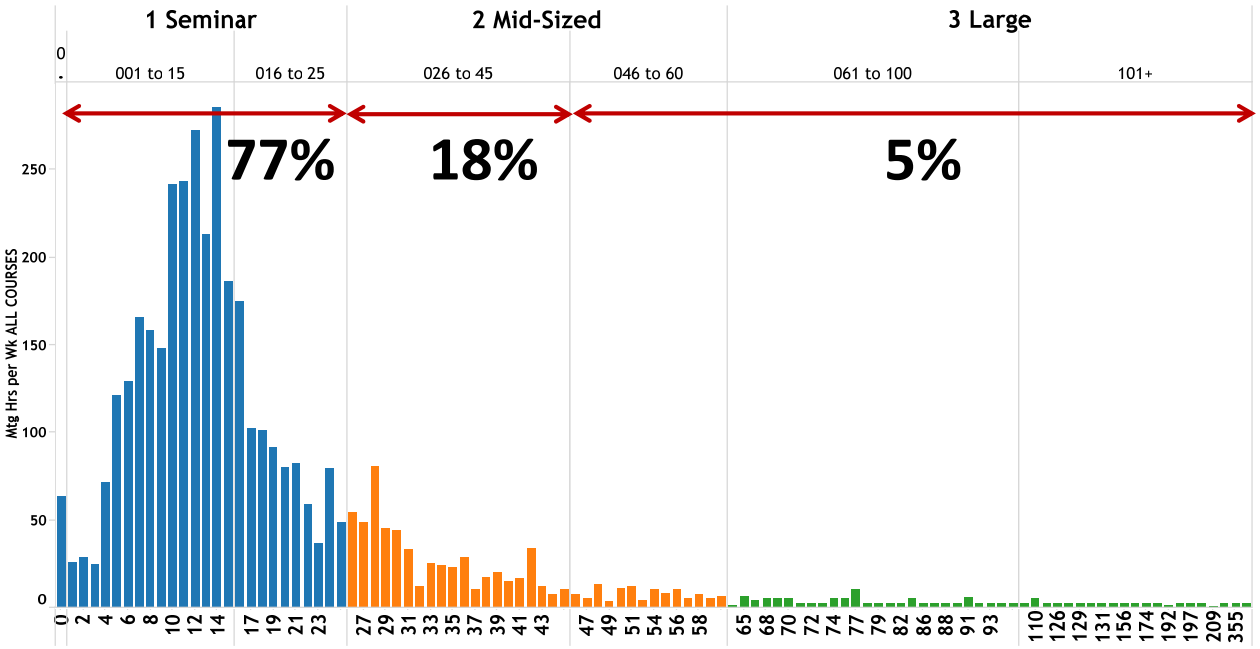
Profile of Instruction

Distribution of Enrollments by Meeting Hours

The enrollment distribution is measured in terms of section meeting hours – the number of hours that are scheduled at each enrollment size. When trying to assess how well room sizes align with enrollments, this measure tends to work best because it accounts for not only class size but also the length of time a room is needed to accommodate a particular class size. As *Chart 5* illustrates, the overwhelming majority of Tufts' sections are small – 77% of meeting hours are for classes that enroll 25 or fewer students. The next largest concentration of enrollments is between 26 to 60 students, with 18% of section meeting hours. Class sizes above 60 students comprise only 5% of total meeting hours.

Chart 5.

Distribution Meeting Hours by Enrollment Size (805am to 845pm)



Enrollment Distribution – Other Measures

Class sections are predominantly undergraduate (88% of total meeting hours, vs. 12% graduate classes). The preponderance occur in Arts & Science disciplines (86%), followed by Engineering (10%) and then Fletcher (4%). By pedagogy, most (86%) are listed as lecture, 6% each for Recitation and Lecture, and 2% other. (Current categorizations, however, do not necessarily reflect the wide range of teaching practices that, based on focus group and survey information, faculty and students are now using.) One-quarter of departments account for more than 50% of all sections.

Scheduling Patterns and Policies

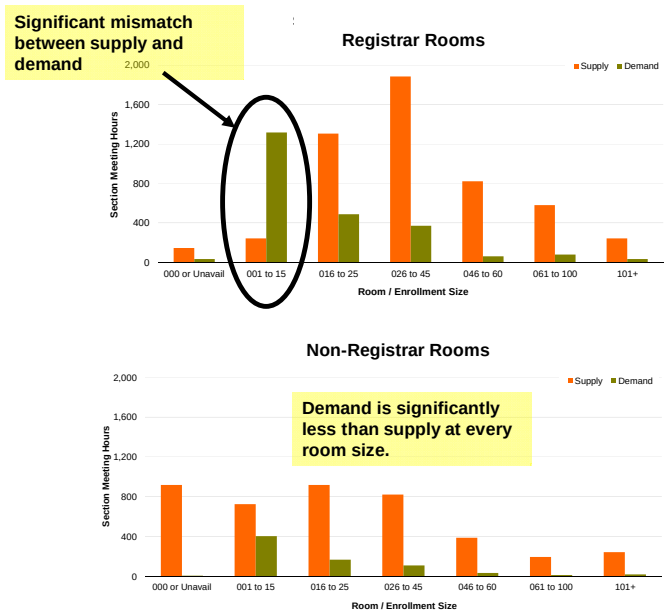
Demand versus Supply By Enrollment / Room Size

Chart 6 depicts the distribution of the enrollments versus the room inventory, measured in meeting hours, in "breakpoints" by size – small (1 to 15 and 16 to 25 students or seats), mid-sized (26 to 45 and 46 to 60), and large (61 to 100 and 101+). As the chart shows (top graph), the preponderance of sections scheduled in Registrar-managed rooms are in the 1 to 15 breakpoint, where there are very few rooms in the inventory. At all other breakpoints, the supply of rooms far exceeds the "demand" – the number of meetings hours of enrollments.

For non-Registrar rooms (bottom graph), the available supply is greater than demand at every breakpoint.

Chart 6.

Supply vs. Demand – Daytime (805am to 545pm)

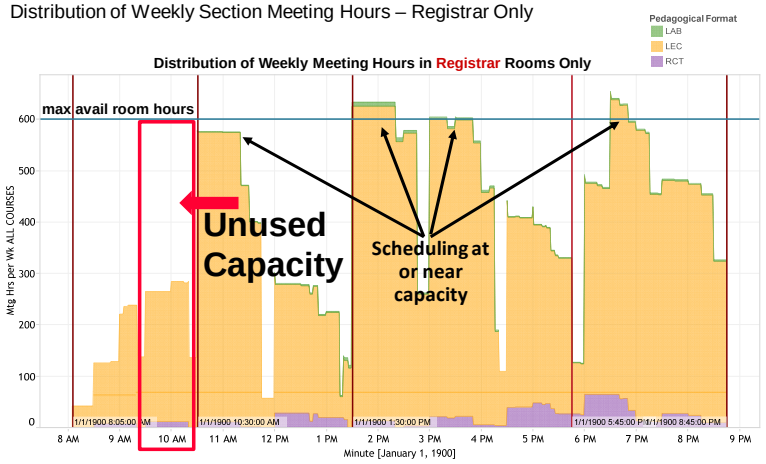


Scheduling by Time of Day – Registrar Rooms

Chart 7 shows that during the afternoon hours (and at some points in the evening), demand for Registrar rooms is at capacity.[2] Early morning times are traditionally unpopular for classes, but at Tufts even the 9:30am to 10:20am hour, often the "actual start" of the scheduling day at other institutions, is significantly underused, and is an area where unused capacity might be captured.

Chart 7.

Distribution of Weekly Section Meeting Hours – Registrar Only



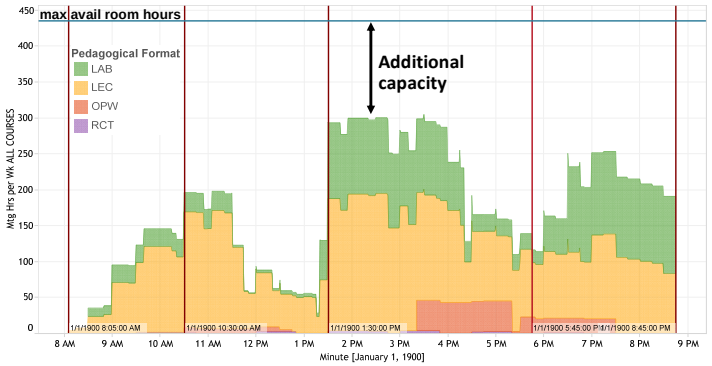
[2] Periods with greater than "max available hours" reflect small anomalies caused by multi-section data entries.

Scheduling by Time of Day – Non-Registrar Rooms

Non-Registrar rooms are heavily used for labs, in addition to lectures, in the afternoon and evening, although formally-scheduled demand does not approach capacity even in peak periods. In large part, this is very likely because much scheduling activity that occurs in non-Registrar rooms is not formally captured in the University's EMS scheduling system. (See *Chart 8*.)

Chart 8.

Distribution of Weekly Section Meeting Hours – Non-Registrar Only



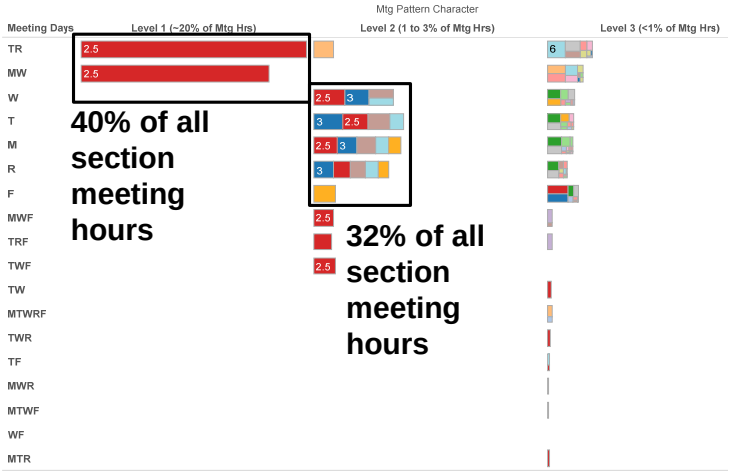
Meeting Patterns

Scheduling patterns indicate how course meeting times are structured throughout the week. Tufts University has 106 discrete scheduling patterns (i.e., different combinations of meeting days + number of meeting hours in a section).

As *Chart 9* shows, the majority are 2-day patterns (Monday-Wednesday and Tuesday-Thursday) totaling 2.5 hours per week; or 1-day patterns, often seminars meeting 2 to 3 hours per week, but also shorter 50 minute meetings that accompany other meetings of a course (e.g., language or math). Together, these two and one-day patterns account for 72% of all section meeting hours. The University schedules very few three-day time blocks.

Chart 9.

Meeting Patterns



Despite the number of individual meeting patterns, most follow standard start and stop times, so there is minimal "blockbusting" (where one class starts after a standard start time in a following period, making it difficult to schedule the following period efficiently). About 2/3 of Tufts' scheduling patterns directly conform to standard start and end times; ~17% conform fairly closely (e.g., a course might end slightly later than a standard end time). Only 16% do not closely conform to standard times.

Meeting patterns that have evolved conform well to the faculty's preferred teaching patterns. Among faculty survey respondents, they prefer, by far, a **two day Tuesday-Thursday or Monday-Wednesday** pattern. There is very little interest in teaching on Friday, or in a Monday-Wednesday-Friday pattern. Preferred teaching times are generally consistent with what the utilization analyses reveal – low interest at noon or in late afternoon. Although respondents indicate little interest in evening hours, utilization analyses show that the evening time frame is well-scheduled.

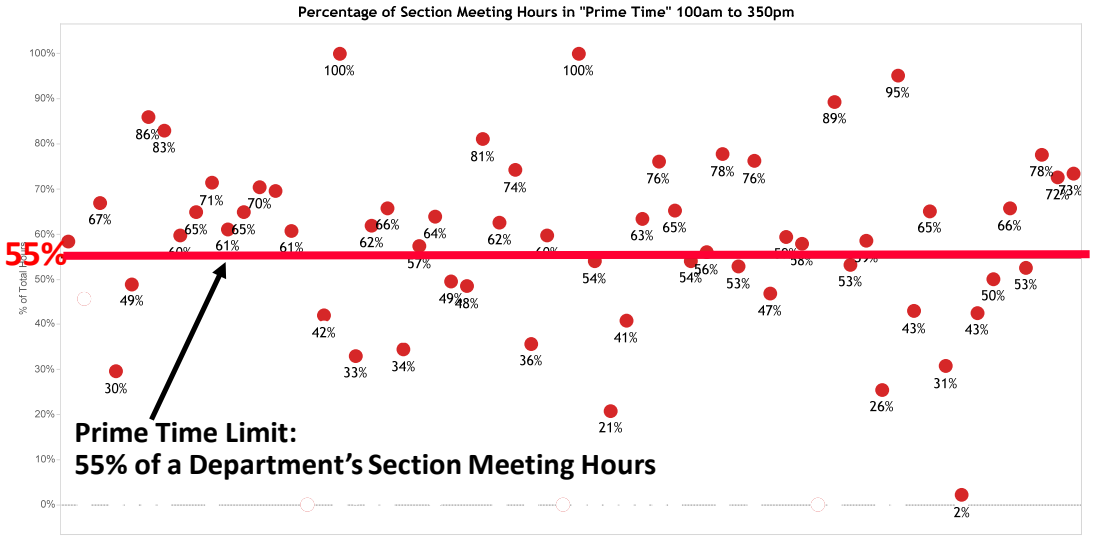
Adherence to 55% Prime Time Scheduling Policy

One of Tufts' scheduling policies is to require that no more than 55% of a department's meeting hours be scheduled between the hours of 10:00am and 3:50pm – dubbed "Prime Time." This is to ensure that each department spreads its scheduling as fully across the day as possible, to minimize room shortages in what are typically preferred scheduling times.

Chart 10 shows that several departments do not fully adhere to this policy. Each dot in the chart represents an individual department by the percentage of hours it schedules in "Prime Time." The horizontal red line drawn at the 55% mark on the y-axis represents the maximum percentage of hours that should be scheduled in Prime Time. As is clear from the chart, many of Tufts departments schedule well above 55% of their course hours in Prime Time (all of the dots above the 55% line). This has the effect of placing significant pressure on learning spaces during the middle of the day, while leaving them underused at some hours at either end of the day (particularly in morning hours).

Chart 10.

Adherence to 55% Prime Time Scheduling Policy



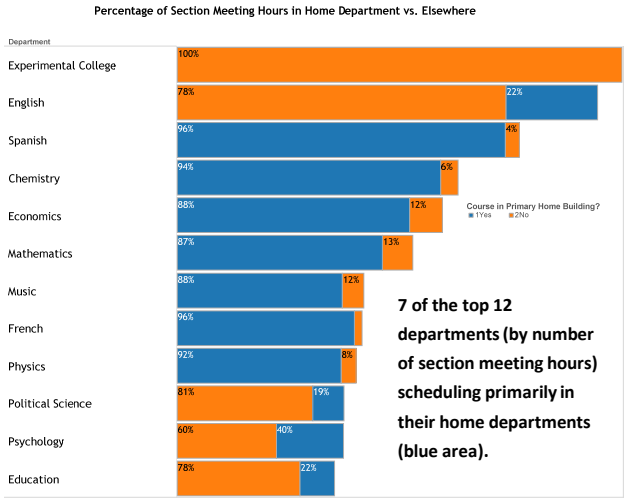
The "Home Court Advantage" Scheduling Policy

Tufts has another scheduling policy that allows departments with Registrar rooms in their "home" buildings to have first-right-of-refusal in scheduling departmental courses in these rooms. This "home court advantage" benefits these departments in that courses can be scheduled close to home. Not only is it convenient for faculty to do so, it is also helpful in creating a sense of identity and community for a department, as it means that students majoring in the subject area spend more time in the departmental building, are close to faculty offices, may spend time working outside of class in the building, etc.

Seven of the top 12 departments (in number of section hours scheduled) schedule primarily in their home departments. (See the blue portions of bar graphs in *Chart 11*.) One downside of this policy is that for departments having few or no classrooms in their buildings, they cannot

Chart 11.

"Home Court Advantage" Scheduling Policy



reap the benefits of a home court advantage. Another is that departments with a home court advantage may sometimes choose convenience over seat efficiency in scheduling a class – that is, they may schedule a small class in a large room in their building simply because the room is available and close-by rather than scheduling the class in a more appropriately-sized room in another building. While large class sections are a relatively small percentage of the overall enrollment distribution, the number of large rooms is also relatively small, and using a large room for a small class can sometimes displace a large class that has a greater need for the space. (While small classes can be scheduled into larger rooms, the reverse, of course, is not true.)

Performance Metrics and Analyses

Several performance metrics exist to assess how effectively learning spaces are scheduled and used. Performance metrics evaluated for Tufts include: (1) room utilization, (2) seat migration, (3) room vs. seat utilization, and (4) seat capacity and square foot allocation per seat.

Room Utilization

Room utilization is a measure of how frequently a room is scheduled during the week. Very simply, if there are 40 hours in a week, and a room is scheduled for 20 of those hours, the room utilization rate is 50%.

For Tufts, room utilization was measured separately for Registrar vs. non-Registrar rooms, and over two different periods – daytime (8:05am to 5:45pm) and evening (5:45pm to 8:45pm).

Registrar Room Utilization

Daytime room utilization for Registrar rooms is approximately 46%. (See *Chart 12*.) There is no universal standard performance target, because the degree of room utilization depends on a wide range of institutional factors (e.g., nature of the curriculum; athletics, co-curricular, and other competing afternoon activities; institutional cultural norms vis-à-vis scheduling at 8am, on Fridays and other less popular times; etc.).

Chart 12.

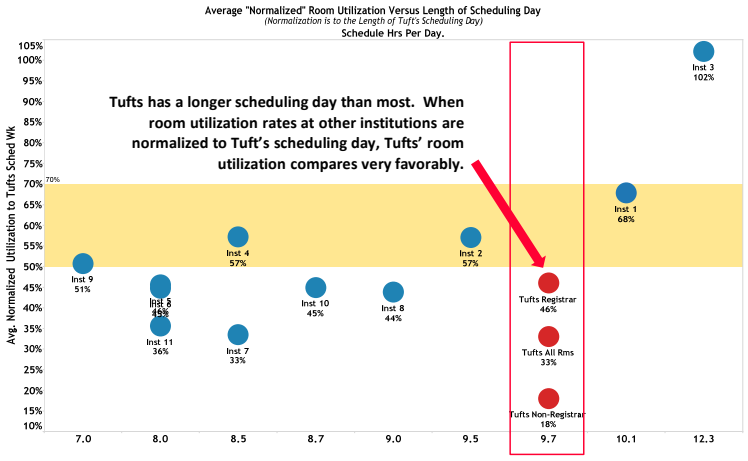
	Rooms	Available Supply	Hours Scheduled	Avg Room Utilization
	No.	*Weekly Hours*	*Weekly Hours*	
8:05am to 5:45pm (Daytime)				
Registrar	108	5,220	2,381	**46%**
Non-Registrar	87	4,205	752	**18%**
All Rooms	**195**	**9,425**	**3,133**	**33%**
5:45pm to 8:45pm (Evening)				
Registrar	108	1,611	654	**41%**
Non-Registrar	87	1,298	269	**21%**
All Rooms	**195**	**2,909**	**923**	**32%**

Biddison Hier recently completed a study in which room utilization at several universities with relatively similar curricular profiles to Tufts was benchmarked. Relative to these institutions, Tufts generally compares favorably. Tufts' daytime room utilization for Registrar rooms is 46% over a relatively long scheduling day (9.7 hours). By contrast, as *Chart 13* shows, most of the other institutions benchmarked have a short scheduling day and similar or lower average room utilization rates.

Evening room utilization, while not typically as important a measure since many schools do not schedule heavily in the evening, is also good at Tufts – 41% room utilization during the three hour evening scheduling block (5:45pm to 8:45pm).

Chart 13.

Comparative Perspective on Daytime Room Utilization



Non-Registrar Room Utilization

Because so much of what occurs in non-Registrar rooms is not formally recorded in the EMS scheduling system, it is not possible to compute a true measure of room utilization for these rooms. Based only on what is recorded in the EMS database, room utilization for non-Registrar rooms is 18% during daytime, and 21% in the evening. Anecdotal information provided in focus groups suggest that there are many activities occurring in these rooms that are not formally scheduled (e.g., departmental meetings, guest lectures and symposia, departmental administrative activities, receptions, etc.).

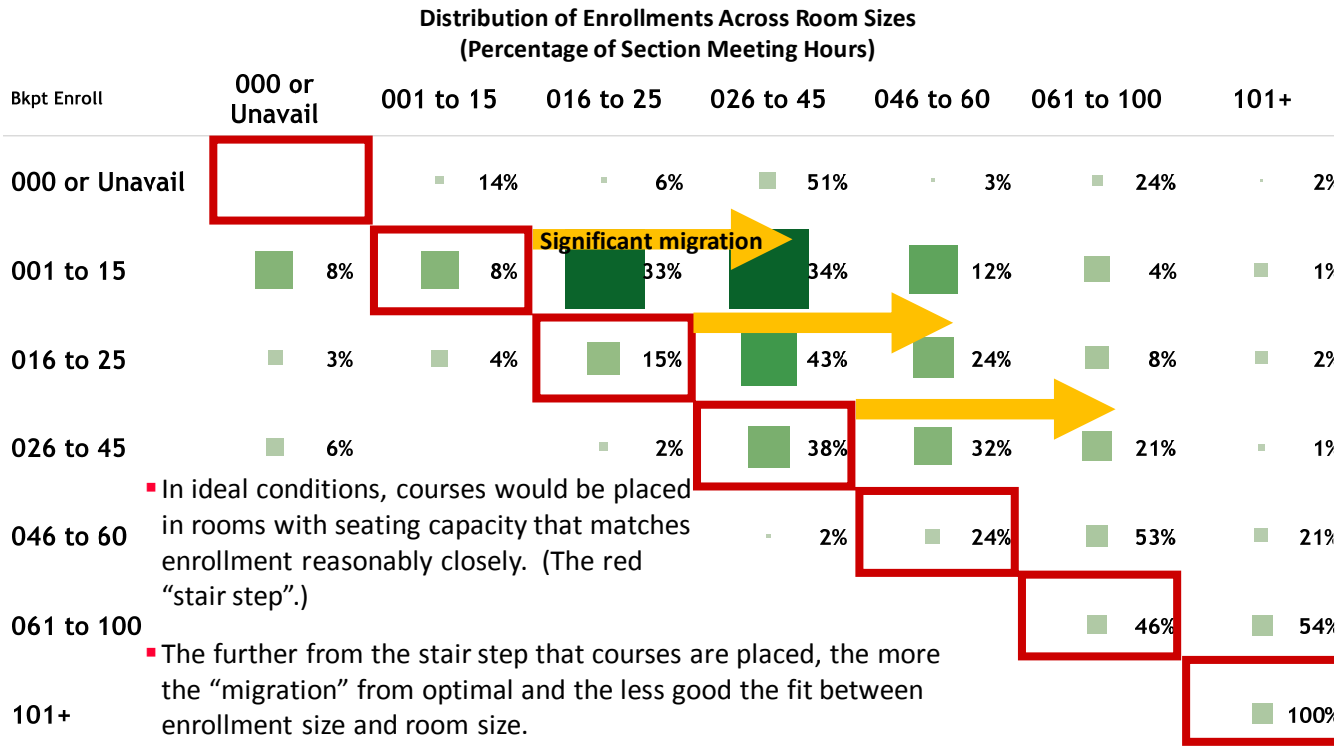
Seat Migration

Seat migration shows the degree of match or mismatch between enrollments and the number of seats in a room. *Chart 14* shows some significant mismatches between class sizes (enrollments) and the rooms into which they are placed. For example, 34% of classes that enroll between 1 and 15 students are being placed in rooms with 26 to 45 seats, and 12% in rooms with 46 to 60 seats.

In an ideal situation, classes would be placed in rooms with seating capacity that is reasonably close to the class enrollment. (The red "stair-step" in *Chart 14*.) When placed in rooms that are much larger, first, the learning experience can be compromised (e.g., 15 students in a room with 45 seats does not create an intimate learning environment); and second, the larger rooms are then unavailable for larger classes that may need them. A long-term goal for Tufts should be to achieve a better scheduling match between class size and room size.

Chart 14.

Seat Migration

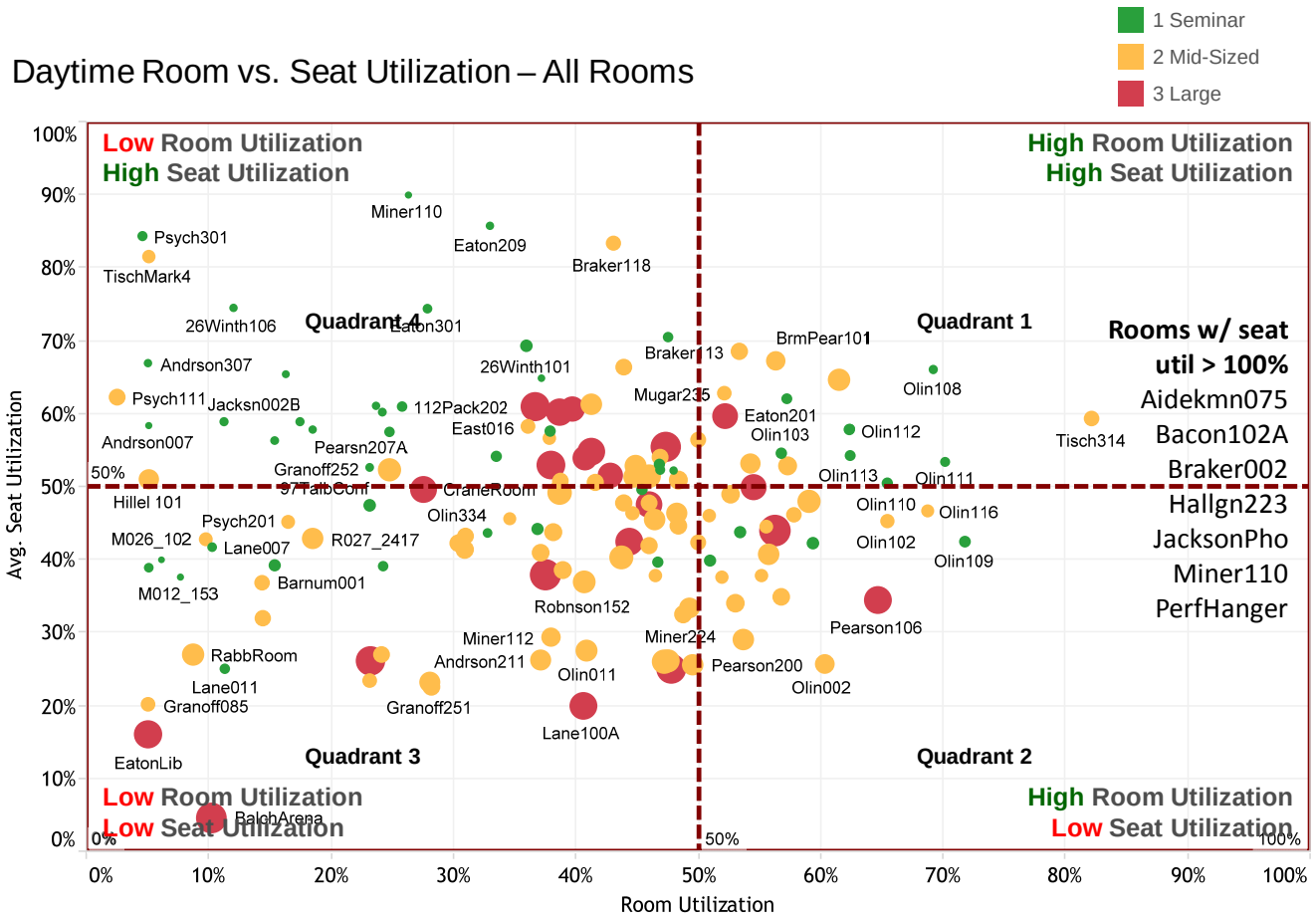


Room vs. Seat Utilization

Seat utilization is a measure of how many seats are filled in a room when it is in use (e.g., if 20 students are placed in a room with 60 seats, seat utilization is 33%). Plotting room against seat utilization gives a good overall picture of the efficiency of room scheduling.

Chart 15 is divided into four quadrants. Quadrant 1 (upper right hand corner) shows rooms that have high room and seat utilization – the preferred condition. Quadrant 3 (lower left hand corner) shows rooms with low room and seat utilization – the least preferred condition. Quadrants 2 and 4 have either high room / low seat utilization, or low room / high seat utilization, respectively. Dot colors represent the sizes of the rooms. As the chart clearly shows, relatively few of Tufts rooms are in the ideal quadrant (Quadrant 1), and a substantial portion are in Quadrant 3 (the least favorable quadrant). Another long-term goal for Tufts is to explore opportunities to improve both room and, especially, seat utilization.

Chart 15.



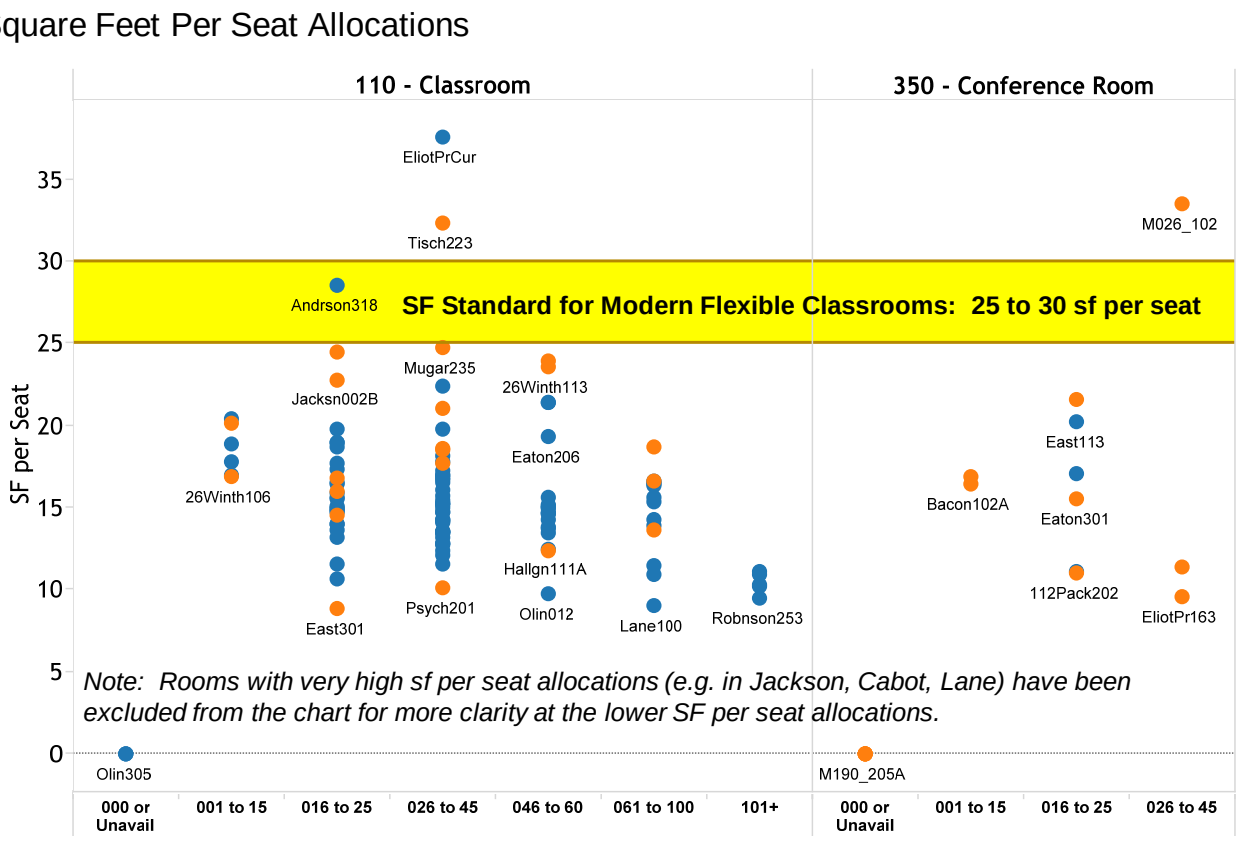
Seat Capacity / SF Per Seat Allocations

Traditional classrooms of the mid- to late-20th century were designed to a typical standard of 15 to 18 square feet per seat. Modern pedagogies require more flexibility and mobility in furnishings and, consequently, more space per seat.

Chart 16 illustrates the modern standard – 25 to 30 square feet – in the bright yellow band. Dots in the chart illustrate the current square footage allocation for each individual room (blue for Registrar and orange for non-Registrar rooms). As is obvious, most of Tufts rooms are below (or in some cases well below) modern square footage per seat allocations. In part, this is a reflection of a different standard when many of these rooms were built. But in part, the learning space assessment revealed (and focus group and survey data confirmed) that a number of Tufts' rooms are "overfurnished" – that is, there is an overabundance of seating in the room given its size and configuration.

This condition presents opportunities to move toward more modern square footage per seat allocation standards and at the same time "right-size" and "de-densify" some rooms through refurnishing in order to achieve more usable and comfortable learning spaces. Recommendations along these lines are presented in "Part 2: The Learning Spaces Strategic Plan."

Chart 16.



Process and Management Issues

At many institutions, it is not unusual to find that learning spaces are "used by all, and managed by none." In the planning and construction process, learning spaces are often an afterthought – adding a classroom or two here or there as an academic building is being planned. In operating and maintaining them, there is often no natural constituency that assumes responsibility. Consequently, learning spaces may not have adequate funding for upkeep and refreshment; they may not be well-maintained; and staff support for on-site troubleshooting may be lacking.

Some of these conditions apply to the learning spaces at Tufts. In recognition of this, an important aspect of the Learning Spaces Assessment was to study process and management issues and identify "points of pain." Information was gathered through the physical assessment, surveys, focus groups and interviews. Key findings are summarized below.

Budgeting and Funding

Funding for learning spaces is drawn from a variety of budgets and is, to some degree, *ad hoc* in that funding tends to be variable from year to year. The Office of Facilities addresses deferred maintenance in classrooms when it can, but there is no dedicated furnishings or operations budget targeted specifically to learning spaces.

The Schools contribute funding for technology, with Tufts Technology Services (TTS) serving in an advisory role to identify technology needs, but funding is not consistent from year to year, making it challenging to develop a long-term strategic approach for technology upgrades and refreshment.

In some cases, departments may fund learning spaces – often for labs or other specialized spaces that are primarily or exclusively used by the department – which may be a process completely independent of any TTS involvement. Finally, capital expenditures related to learning spaces may come as an overall part of larger capital projects, but there is no dedicated source of funding for large-scale reinvestment in learning spaces.

The bottom line is that the lack of dedicated and adequate funding makes strategic planning for and investment in learning spaces challenging if not impossible.

Pedagogy

Pedagogies are evolving with new technologies and new advancements in research on effective teaching methodologies. Tufts has several entities involved in pedagogical planning and development. Four primary groups were identified in the course of the Strategic Plan development, as described below. While each addresses instructional pedagogies in some form, and the groups are certainly aware of each other and some of their activities, there does not appear to be at this time formal or regular communications that could help shape campus discussions to create better alignments between learning spaces and new pedagogies.

Classroom Committee

The Classroom Committee is an advisory committee comprised of faculty and staff. It has no funding and is charged with offering advice and comment on all facets of learning spaces. In recognition that learning spaces are a priority focus for Tufts at this time, this committee was reconstituted from an earlier iteration from years ago, and its size significantly increased. The Committee includes three working subgroups: (1) classroom technology – e.g., how can technology be implemented in ways that support how faculty want to teach; (2) planning and pedagogy –

e.g., how pedagogy affects learning environments and what are the associated planning and budgeting implications; and (3) maintenance and upkeep – e.g., how best to support ongoing operation of learning spaces.

CELT (Center for Enhancement of Teaching and Learning)

CELT is a center dedicated to assisting faculty in the development of incorporation of evolving and new pedagogies in their classrooms. Members of the CELT staff work closely with faculty, in individual consultations and in group programs. CELT's primary goals include: (1) providing professional development opportunities (seminars and workshops); (2) offering individual faculty consultations on teaching, assessment, and evaluation; and (3) providing electronic and print resources to support faculty programs.

ESTS (Educational and Scholarly Technology Services)

ESTS is a University-wide group whose mission is to "support meaningful integration of technology into academic programs and courses."[3] The group's focus includes: (1) working with faculty individually and in group settings to support technology-enhanced solutions to teaching and learning; (2) designing, developing and integrating academic technology applications; and (2) providing services to enable education & scholarship. Activities may include innovative symposia, hands-on workshops, communities of practice, and instructional design support.

DDS (Digital Design Studio)

The DDS is a creative space located in the Tisch Library. DDS staff provide support for production of digital class projects and the exploration of digital media. The space includes a variety of equipment and technology (e.g., multi-media workstations, large format printers, digitization stations, recording rooms, a green screen wall) that are available to the Tufts community. It also provides a variety of teaching and research support to faculty interested in digital design activities (e.g., storyboarding and production techniques, support for converting and digitizing older media formats for classroom activities, etc.).

Technology

In modern classrooms, there should be a baseline level of technology in every teaching space, which should be consistent across all rooms and reasonably easy to use. Further, there should be access to good and quick support when there are inevitable glitches with technology. This condition does not uniformly exist across learning spaces at Tufts.

In the planning and outfitting of rooms, better integration is needed to connect technology to pedagogies. As noted above, a number of committees and groups deal with evolving pedagogies, but at present there are not many formal lines of interaction between groups evolving pedagogies and Tufts Technology Services (TTS), the group of technologists on-campus charged with implementing and managing technology operations. (And rooms that are managed by departments are theoretically not supported at all by TTS, although in practice, some technology needs may be addressed on an *ad hoc* basis.)

Finally, plans for refreshing technology are developed from year to year (or perhaps for a few years in advance, depending on funding availability), and typically the most pressing needs are addressed. But there is no long-term strategic plan or vision (or associated funding) to develop a coordinated strategy for technology upgrades and alignments with emerging pedagogies.

[3] See ESTS website: https://it.tufts.edu/ests.

Room Management

Historically, different aspects of learning spaces at Tufts have been managed in different ways. Basic daily cleaning is typically managed by the Office of Facilities. Beyond basic cleaning, approaches vary: some departments have historically appointed a "building curator" – an administrator residing in the building, who ensures that chalk or markers are available, assists with technology; etc. In other buildings, there is no specific person in charge of learning spaces; in such cases, technology support might come from TTS, while faculty themselves might end up being responsible for bringing markers or chalk to a room, resetting a room when chairs have been moved, etc. In short, there are currently no standards or systems in place to ensure consistent upkeep and operation of formal teaching spaces. And to the extent that any mechanisms *are* in place for Registrar-managed rooms, departmental rooms remain out of that loop.

Planning

Long-Term Planning

As at many other institutions, there is need for better integration (and earlier involvement) among areas involved in project planning and implementation (e.g., Facilities, project administration, project management, technology, etc.). Until this Learning Spaces study was undertaken, there was no single source for information on learning space needs. With completion of the study, the Plan can now be used to provide long-term strategic guidance on learning space needs. Whenever any major renovation or new construction project is considered, the Strategic Plan can provide foundational information to inform how learning space needs might be incorporated into the overall project.

Assessment

Prior to this study, there was no comprehensive, formal database of information on various conditions in learning spaces – fit-out, technology, physical conditions, environmental elements, etc. A significant aspect of this assignment was to develop a learning spaces assessment tool, and to undertake a comprehensive inventory of formal and informal learning spaces. Over time, this assessment will need to be maintained and updated to keep current with upgrades and modernizations to learning spaces.

Summary of Key Issues

The research phase of the project identified several areas to focus on in developing the Learning Spaces Strategic Plan.

Misalignment of Inventory with Modern Pedagogical Approaches.

Many of Tufts' formal teaching spaces at Tufts are not well-suited to the types of teaching that faculty wish to do. According to the faculty survey, 80% of respondents have had to adapt their teaching styles to conform to their assigned classroom, and 55% said that the lack of a suitable teaching space hampered them from exploring new teaching methods.

In general, faculty seek more flexibility in and outside the classroom – e.g., being able to move furnishings around quickly to teach in different configurations; facilitating greater interactions among students; teaching from someplace other than a podium at the front; having group study / breakout areas near classrooms; etc. Tablet arm chairs, which comprise more than 50% of the formal learning space inventory, are not well-suited to the range of pedagogies that faculty use and would like to use. Further, many of Tufts rooms are overfurnished with these chairs. The standard for modern flexible classroom spaces is typically 25 to 30 square feet per seat, but is often as low as 10 to 15 square feet per seat at Tufts.

Upgrades to Physical Conditions

Many of Tufts learning spaces were built long ago and are overdue for refreshing and modernization. Required renovations range from the basic (paint, carpet, improved lighting) to changes to improve functionality (e.g., repositioning boards or screens so that both can be used simultaneously, adding electrical outlets to accommodate widespread use of laptops and other devices). Conditions can vary from room to room and building to building, making the teaching experience very different depending on the space a class has been scheduled into.

Enrollments and Supply versus Demand

Class sizes at Tufts are overwhelmingly small (77% have 25 or fewer students), and there are some misalignments between room size and class size. The supply of rooms at the mid and upper ends of seat capacity (26 seats and above) far exceeds the number of sections that need rooms of that size.

Scheduling, Utilization and Scheduling Policies

Tufts' predominant scheduling patterns are two-day meetings on Monday-Wednesday or Tuesday-Thursday, and a wide range of one-day patterns. There are relatively few three-day patterns, and lower utilization on Fridays than other days. Nonetheless, the preponderance of Tufts' sections adhere to general schedule block time frames, which allows for reasonably efficient room scheduling.

In Registrar rooms, average utilization over the week is generally good – 46% over a 9.7 hour day, which compares favorably with benchmarks reviewed for the study. However, there is unused capacity in the morning hours. Further, Tufts has in place a policy that no more than 55% of a department's sections should be scheduled in "Prime Time" (10am to 3:50pm), but many departments do not adhere to this policy. Not all departments have the ability to schedule sections in their buildings, but for those that do, seven of the twelve largest departments schedule the preponderance of classes in their buildings – taking advantage of Tufts' "home court advantage" policy. This sometimes results in smaller sections being scheduled in rooms that are larger than necessary, simply because of the room's proximity to the department.

Scheduling data for non-Registrar rooms appears to be highly incomplete, as only formal classes that are held in these rooms are recorded in the Tufts scheduling database (EMS).

Process and Management Issues around Learning Spaces

Budgets. Funding for learning spaces, to the extent that it exists, is decentralized among several entities, and somewhat *ad hoc* from year to year, making it difficult to develop long-term plans for managing and upgrading learning spaces. There is need for better coordination of budgets to support learning spaces, as well as more consistent and reliable funding for technology, furnishings and other upgrades.

Pedagogy. Many entities (e.g., Centers, committees) exist to advance the state of the art in teaching, and to involve faculty in exploring new pedagogical approaches. New pedagogies have significant implications for furnishings, fit-out and technology in classrooms, but there is no easy way to make the link between research and development on evolving pedagogies and implementing change in classrooms.

Operational Aspects of Learning Spaces. Learning spaces at Tufts, as at many other institutions, are not organizationally under one single area of the University. Rather, different aspects of learning space (e.g., technology, furnishing, scheduling, maintenance and operations, etc.) are managed by different groups within the University, or in some cases not at all. Basic cleaning and maintenance, for example, are covered by the Office of Facilities, but there is no specific budget authority there or in any other office for furniture replacement. Technology is generally coordinated by Tufts Technology Services (TTS) but in some cases departments fund and manage their own technology. With no easy way to understand "the big picture" for learning spaces, some critical needs (e.g., overfurnishing of rooms; needs for upgrades and modernization, etc.) have not been addressed over the years.

Information. Information on learning spaces has been scattered and spotty. Until this study, Tufts did not have a reliable database of information on conditions in learning spaces. The study included a comprehensive assessment, in which information was collected on basic room conditions, both quantitative (e.g., number and type of seats, white and / or blackboards, screens, wireless access and other technologies, etc.) and qualitative (e.g., quality of spaces, environmental conditions, sight lines, etc.)

Part 2
The Learning Spaces Strategic Plan

Section 2.1: Overview of Recommendations

Introduction

Supporting a high quality learning experience extends well beyond simple physical changes to classrooms, as analyses conducted in development of the Learning Spaces Strategic Plan (the "Strategic Plan) made clear. The Strategic Plan acknowledges this by including recommendations in four key areas that have an impact on learning spaces:

5. **Strategy and Program [SP].** These are key principles that drive the planning and design of learning spaces, and the activities that occur within them.
6. **Physical and Technology [PT].** Proposed changes and upgrades.
7. **Scheduling [SC].** Policy changes to promote better use of learning spaces.
8. **Process and Management [PM].** Actions to improve the function and operation of learning spaces, and ongoing planning for them.

Section 2.2: Strategy and Program Recommendations

Strategic and program recommendations focus on principles and program activities that drive planning and design of learning spaces. There are two major areas of focus for strategic and program recommendations proposed:

- Defining room terminology to align with pedagogies
- Encouraging faculty participation in pedagogical innovation.

AREA A
Defining Room Terminology to Align with Pedagogies

A significant finding of the planning effort was that learning spaces at Tufts have not kept pace with the evolution of new pedagogical styles that faculty increasingly use. In fact, even traditional terminology for learning spaces – e.g., lecture halls, seminar rooms – is no longer adequate to describe room types needed to support new pedagogies. Learning spaces need to be more flexible – in furnishings, technology, configuration, etc. Rather than trying to determine what type of activities a lecture hall or seminar room can support, it is more useful to determine what type of room can best support activities that may occur within. This approach highlights the idea that rooms should be designed to fit pedagogies and not the other way around.

Recommendation SP1

Develop new language and a new approach for describing design requirements for learning spaces, focusing on the experience faculty and students have in these spaces.

New language should be used to describe and align learning spaces more accurately with modern pedagogies, which can be somewhat fluid in their character. The following "learning space types" represent a range of activities that are a good starting point for describing new nomenclature:

1 Interactive Presentation

This is a faculty-led class session with student participation. During class, visual content (slides) and other digital media are used to support ideas. Technology is such that it is easy for students to discover, co-create, and/or share information digitally.

2 Project-Based Class with Team Activities

This class begins with a faculty-led discussion of lesson, lesson plan, and team activities. Students then break out into small teams to work on an assigned task. In these small team sessions, students use their laptops, the Internet and other resources to discover, co-create, and/or share information digitally within the team. As work evolves in these small group sessions, the faculty member calls on particular teams to share their results to the class. Then the faculty member leads a discussion of activity, team results, and implications in the context of the lesson plan's intended content.

3 Class Discussion that Includes a Remote Expert

A faculty member on-site leads a class discussion and moderates interaction between students and a remote expert participating through some interactive technology medium (e.g., Skype). Visual content and other digital media are used to support ideas from the remote expert. Students ask questions, search online for relevant background information, and make annotations to the materials that the remote expert has shared.

4 In-Class Exercises that Follow-Up to a Field Experience

The faculty member assigns (possibly in a previous session) a specific field experience in which students are asked to collect observational data, navigate a simulated exercise, or hunt for predetermined clues outside of the classroom. Students return to class with digital media content captured during the field experience. The faculty member leads the class in a discussion about the activity and guides students through the data analysis. Together they compare and contrast results and extract key concepts from the exercise. Students are able to collect results from the analysis and save them to their own storage repository (on their device, on a memory stick, to a cloud-based repository, etc.) to incorporate into a home assignment in which they reflect on the activity and draw individual conclusions.

Team Collaboration (Outside of Class)

A small team (e.g., 3 to 8 students) meets outside of the classroom. Each student brings a laptop, tablet, or smartphone device. One of the students has a copy of the assignment and shares it digitally to a flat panel display mounted on the wall. Other students who have developed some preliminary information also share it to the common screen. One of the students lays out an agenda and process diagram on a ceramic whiteboard that captures all content digitally. The students work through the assignment together, taking turns sharing ideas, performing *ad hoc* searches and sharing the results, and ultimately co-creating the deliverable required for the assignment. When the group breaks up the meeting, they are able to share copies of all the material they shared as well as the latest state of the deliverable they have developed so that they can bring the content to a future meeting, or to their next class session.

Examples above describe different kinds of activities that learning spaces should be able to support, but there is not necessarily a one-to-one correlation between a particular example and a type of space. Several examples make use of various technologies, vary the configurations in which students meet during class (lecture format, small group work, etc.), and even vary the role of the faculty member (lecturer, discussion leader, coach, etc.). Accordingly, the following guiding principle should govern thinking and actions when considering upgrading, modernizing or building new learning spaces.

Guiding Principle

When renovating existing or planning new learning spaces, make them flexible enough to support as many different pedagogical conditions as possible.

Specific recommendations for creating better and more flexible spaces through physical and technology changes are addressed below in "*Section 2.3 Physical and Technology Recommendations.*"

AREA B
Encouraging Faculty Participation in Pedagogical Innovation

Tufts has many initiatives aimed at developing and enhancing the teaching and learning experience – e.g., the Center for Enhancement of Teaching and Learning (CELT), Educational and Scholarly Technology Services (ESTS), and the Digital Design Studio (DDS). Some faculty – the "early adopters" – are highly interested in exploring and implementing new pedagogical approaches. Others find their traditional teaching methods work well for them.

While each faculty member will, of course, choose what works best for her / him, there are actions that Tufts can take to promote and encourage greater faculty participation in developing and using innovative pedagogies, as described below.

Recommendation SP2
Develop more programs to help faculty develop best practices.

Building on the work of CELT, ESTS, DDS and other initiatives on campus, develop additional programs that help faculty understand and employ best practices for using classroom technologies to support different teaching modalities (and to pick appropriate modalities). Some programs should be organized by discipline, others should be interdisciplinary in order to facilitate both the building of cohorts within departments as well as the cross-pollination of ideas across departments.

Recommendation SP3
Recruit support of the Deans to elevate the status of teaching enhancement programs.

Beyond the early adopters, other faculty may need encouragement to consider how pedagogical innovations may be applied to their subject matter and teaching approaches, and to participate in teaching enhancement programs. Support and encouragement from Tufts' Deans can be an important way to elevate the status of these programs. Deans can promote these programs in a number of ways. A few examples:

- Develop incentives to promote faculty participation (e.g., allocate funding for new technologies, more flexible furnishings, and other learning space enhancements that make it easier to adopt new pedagogical approaches).
- Bolster the teaching component in promotion and tenure decisions.
- Tie these programs to certification or ongoing professional development activities.

Recommendation SP4
Build a faculty fellows program.

Consider developing a Faculty Fellows program that incorporates both instructional design and instructional technologies training. This type of program can be an attractive incentive for encouraging faculty toward pedagogical innovation. The program can draw from materials within existing initiatives as well as create new

materials of its own. Benchmarking the program against similar programs at other institutions will provide a baseline for assessment and a roadmap to success. Participation will be a key indicator in the success of a Faculty Fellows program and as such the program should be endowed to build its prestige. Incentives (e.g., monetary award or stipend) will probably need to be offered encourage faculty to apply for the program. Require a dissemination component from all fellows – e.g., participation in a faculty seminar series, preparation of a summary report on activities and successes in pedagogical innovation, lessons learned, etc.

Recommendation SP5

Develop a student component to the CELT and other programs focused on pedagogical innovation.

Students are a great source of "in-the-field" feedback on what works and does not work in pedagogical innovations. They provide the reality check. (In a student focus group conducted during the research phase of this study, one student astutely pointed out that "technology and innovation only makes sense when it helps the learning process.") For programs that do not now include student involvement, Tufts should retool or augment these programs to ensure that the student perspective is included.

Section 2.3: Physical and Technology Recommendations

Physical and technology recommendations focus on specific changes and upgrades that need to be made to create learning spaces that are better aligned with modern pedagogies and technology applications, and more generally, that result in an inventory of learning spaces that in look and feel match the quality of teaching that occurs within and that is consistent with the overall reputation of Tufts. Recommendations are in several areas:

- Creating learning spaces that can accommodate a wide range of pedagogies
- Achieving a baseline quality level across learning spaces
- Transitioning from presentation technologies to those that support student participation
- Providing adequate staffing for technology
- Funding to modernize and refresh learning spaces.

AREA A
Creating Learning Spaces that can Accommodate a Wide Range of Pedagogies

Many of Tufts' classrooms have two significant problems. First, they fall below or well below modern square footage standards for learning spaces, which typically call for ~25 to 30 square feet per seat (somewhat lower for larger, traditional lecture halls). Tufts' rooms are often in the range of 10 to 15 sf per seat. As a result, many rooms feel "overfurnished" – too many seats make the room feel crowded and / or create difficulty moving around the room.

Second, they do not have the right type of furnishings to support flexible teaching and learning activities prevalent in 21st century classrooms (e.g., moving from lecture to group-based learning formats). More than 50% of Tufts' Registrar rooms have some type of tablet arm chair.

The example shown at right illustrates the point. At the time of the learning space physical assessment, Anderson Hall 313 had 51 seats. Based on the room size, this equates to 15 square feet per seat. The room is furnished with tablet arm chairs, lined up tightly in rows with narrow aisles for students to access seats. This configurations results in a room that feels cramped, difficult to navigate, and with little flexibility to support any pedagogy other than straight lecturing. Applying a modern square footage allocation, this room would have only 37 seats.

Righsizing and refurnishing recommendations below are designed to address problems like this and improve conditions in many of Tufts learning spaces.

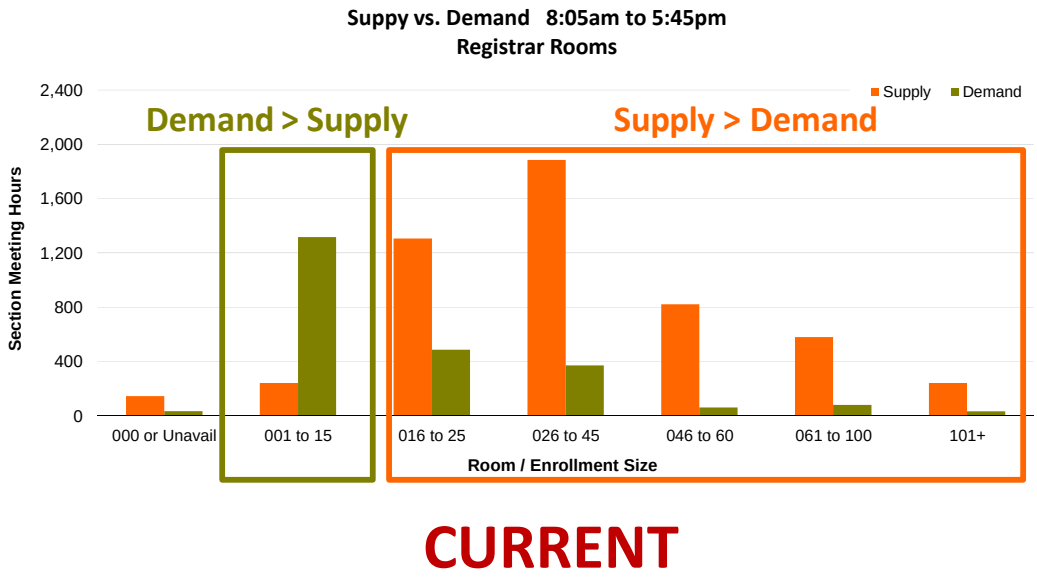
Recommendation PT1

"Rightsize the inventory" to meet modern square footage standards.

"Rightsizing" is the process of adjusting the number of seats or stations in a learning space so that the square footage allocation per seat aligns more closely with modern standards – usually between 25 and 30 square feet per seat. This process can include removing a portion of seats in the room so that there is more room to move around (and hence achieve a higher square footage allocation) and / or replacing current furnishings with more flexible furnishings – e.g., chairs and tables on wheels, tables that may be easily folded down and rolled to the side, etc., also at a higher square footage per seat allocation.

Rightsizing the learning spaces inventory through selective removal of seats is a relatively low cost activity with high impact results, and the situation at Tufts is particularly conducive to the concept of rightsizing. As *Chart 17* shows, in the Registrar inventory of learning spaces, there is currently an excess supply of larger rooms and a large demand for smaller rooms. Without purchasing new furniture, an action as simple as removing some existing tablet arm chairs can improve the teaching and learning experience in a number of classrooms. Beyond simply removing seats, however, part of the rightsizing effort also should involve replacing existing seats with new furnishings that are better suited to modern pedagogical styles. (*Recommendation PT 2* directly below.)

Chart 17.



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Recommendation PT 2

Replace the preponderance of tablet arm chairs (movable and fixed) with movable tables and chairs to create more flexibility in accommodating modern pedagogies.

Existing furnishings at Tufts are predominantly tablet arm chairs which are not well-suited to current and emerging pedagogies. Faculty surveyed suggest that 80% of seminar rooms and 50% of mid-sized rooms should have movable tables and chairs to allow flexibility for different teaching formats. *Chart 18* shows that the current inventory falls well short of this – only 43% of seminar rooms and 22% of mid-sized rooms have movable tables and chairs.

Chart 18.

Current Distribution of Furnishing Types by Room Size (in Classrooms & Conf Rms)

Furnishing Type	Seminar Rooms		Mid-Sized Rooms		Large Rooms	
	Pct.	*No.*	*Pct.*	*No.*	*Pct.*	*No.*
Fixed chairs only					5%	1
Fixed chairs, drop tablet arm			4%	3	42%	8
Movable chairs, fixed tablet arm	31%	17	70%	47	32%	6
Movable chairs, drop tablet arm	2%	1	1%	1		
Movable chairs, fixed table(s)	Now 43%	Preferred 80% 14	Now 22%	Preferred 50% 4	11%	2
Movable chairs, movable tables		10		11	5%	1
Uncategorized	24%	13	1%	1	5%	1
Total	100%	55	100%	67	100%	19

The Strategic Plan recommends refurnishing portions of the seminar and mid-sized room inventories with movable tables and chairs to achieve an inventory that is more closely aligned with desired learning space configurations.

- **Seminar Rooms:** Refurnish 20 seminar rooms with either (a) movable chairs and movable tables (12); or (b) movable chairs and fixed (conference) tables (8) to result in 80% of the seminar inventory being aligned with the preferred room configuration expressed in the faculty survey.
- **Mid-sized general purpose classrooms:** Refurnish 23 rooms with movable tables and moveable chairs to result in 50% of the inventory in this configuration, in line with preferences expressed in the faculty survey.

Refurnishing can have high impact results. First, more flexible furnishings support a wider variety of pedagogies. Second, the balance is shifted from larger rooms, where there is excess supply, to small rooms, for which there is more demand. As a corollary, the number of scheduling hours available in smaller room sizes will also increase, possibly by as much as 60%. *Chart 19* shows the potential change in number and percentages of rooms in each inventory size associated with the above recommendations for refurnishing.

Chart 19.

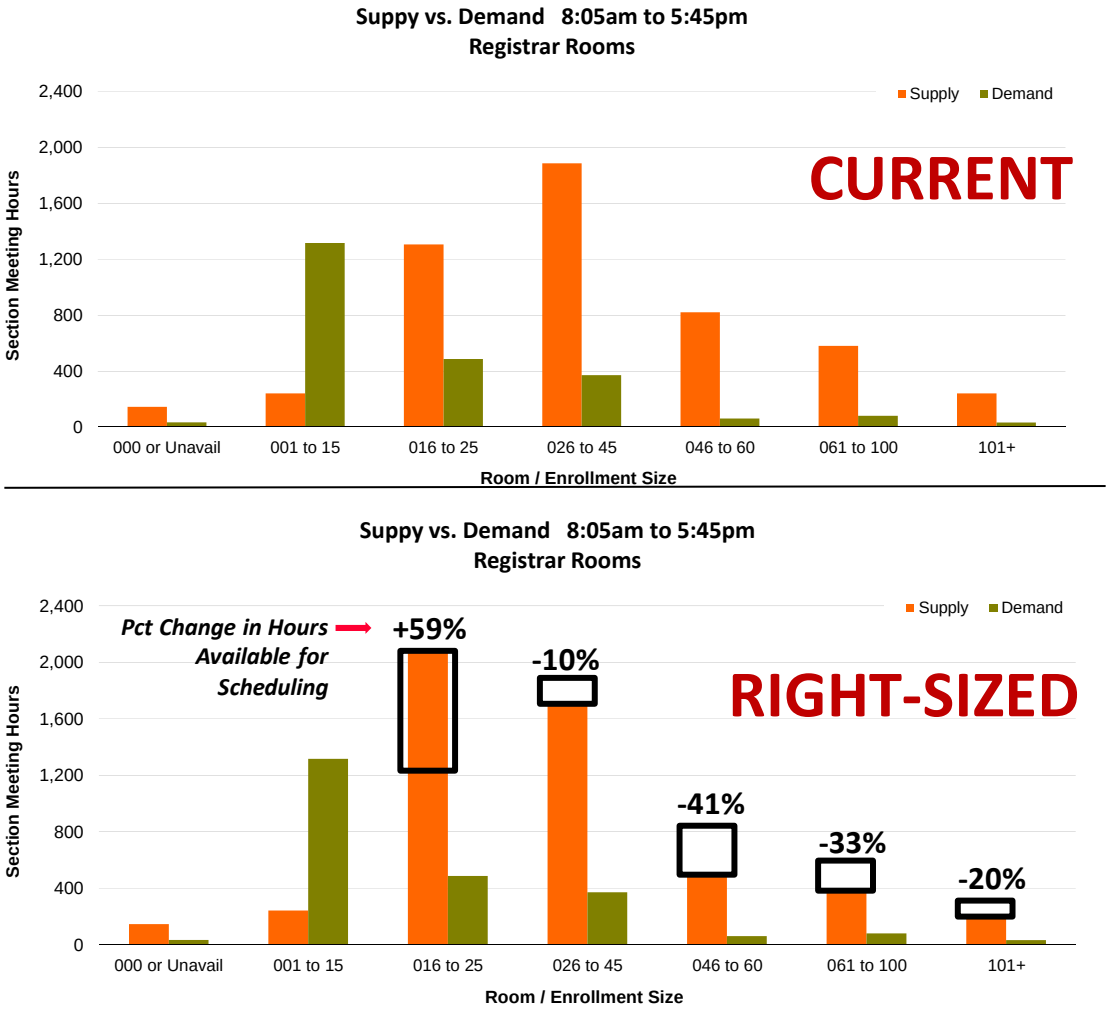
Impact of Moving to Preferrred Distribution of Furnishing Types by Room Size (in Classrooms & Conf Rms)

Furnishing Type	Seminar Rooms					Mid-Sized Rooms					Large Rooms				
	Current		Preferred		Change	Current		Preferred		Change	Current		Preferred		Change
	Pct.	*No.*	*Pct.*	*No.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*No.*
Fixed chairs only											5%	1			(1)
Fixed chairs, drop tablet arm						4%	3			(3)	42%	8	70%	13	5
Movable chairs, fixed tablet arm	31%	17	20%	11	(6)	70%	47	50%	33	(14)	32%	6			(6)
Movable chairs, drop tablet arm	2%	1			(1)	1%	1			(1)			15%	3	3
Movable chairs, fixed table(s)	25%	14	40%	22	8	6%	4		0	(4)	11%	2			(2)
Movable chairs, movable tables	18%	10	40%	22	12	16%	11	50%	34	23	5%	1	15%	3	2
Uncategorized	24%	13			(13)	1%	1			(1)	5%	1			(1)
Total	100%	55	100%	55	0	100%	67	100%	67	0	100%	19	100%	19	0

43% → 80% 22% → 50%

In short, "rightsizing" to modern square footage standards by refurnishing produces a very different mix, more comfortable (less crowded) rooms, and a better match between enrollment and room size. *Chart 20* shows how the inventory might shift as a result of rightsizing, achieving a much better balance between supply and demand, a potential 59% increase in scheduling hours in rooms with 16 to 25 seats made available by reductions of 51%, 33% and 20%, respectively, in the three largest breakpoints (46 seats and above). (It should be noted that even with these changes, the supply in the top three breakpoints is still well in excess of demand.)

Chart 20.



Caveat: When identifying specific rooms to rightsize, it will be important to run test scheduling scenarios with the proposed rightsized inventory to ensure that all courses can continue to be placed. Although the number of large sections at Tufts is small relative to the overall course mix, some larger rooms will still be needed even if the number of large sections to fill them is small. (While one can schedule a section enrolling 15 students in a room of 75 seats – not ideal, but possible – the reverse is not true; a 75 person section needs a room with at least 75 seats.) Running test scheduling scenarios with different options for rightsizing rooms will ensure that the final group of rooms selected for rightsizing will not adversely affect the ability to accommodate large section scheduling requirements.

AREA B
Achieving a Baseline Quality Level Across Learning Spaces

As at many other institutions, Tufts learning spaces were created over long periods of time, with varying levels of upkeep and maintenance. As a result, there is a wide disparity in physical conditions and in the ability to support modern pedagogies. A careful review of physical conditions resulting from the learning space physical assessment revealed that a preponderance of Tufts learning spaces are overdue for renovation to enhance cosmetic appeal, improve configuration, and enrich learning experiences.

Recommendation PT 3

Adopt a 5-year plan for renovations to bring Tufts learning spaces to a baseline quality level, and to make them better able to support modern pedagogies.

Proposed Renovations

T**hree levels of renovation** have been developed and are recommended, with the goal of bringing all learning spaces to a consistent base level of quality and fit-out over a period of roughly five years. These three levels correspond to increasing levels of both impact and investment, as described below.[4]

Level 1 – Minor Intervention
Approximately one day of labor would make a significant impact on room function and atmosphere. Interventions such as patching / painting, lighting adjustments, new whiteboards, new blinds, etc. are included in this level of commitment. The approximate cost of a Level 1 intervention would be ***$10 per SF (2015 dollars).***

Level 2 – Minor Intervention and New Furniture
This option would include everything stated in Level 1 as well as the inclusion of new furniture to meet current standards for seating density (assume 20 to 30 square feet per seat). In general, this includes replacing tablet arm chairs with moveable tables and chairs. The approximate cost of a Level 2 intervention would be ***$25 per SF (2015 dollars).***

Level 3 – Moderate Renovation
Level 3 would generally provide all new finishes to floors, walls, and ceilings. This level includes reconfiguration of partition walls to accommodate storage / informal learning areas, changes to lighting fixtures, electrical components, and new furniture. The approximate cost of a Level 3 intervention would be ***$100 per SF (2015 dollars).***

Determining Priorities

Understanding that resources for renovation are not unlimited, the Plan defines and recommends two tiers of priority to guide renovation and reinvestment.

Tier 1 Priorities
Tier 1 focuses efforts near the heart of the campus, in rooms that are well-utilized, in rooms resizable to seat capacities of 15 to 25 seats, and in rooms with poor layout and furnishing scores in the Learning Space Assessment.

Tier 2 Priorities

[4] Furnishing guidelines are included in *Appendix 3*.

These rooms would generally include rooms further from the center of campus as well as both the smallest of rooms and the large lecture halls (Barnum, Pearson).

Chart 21 identifies buildings and rooms recommended for action by (1) level of intervention and (2) level of priority.

Chart 21.

Overview of Proposed Renovation Actions and Priorities

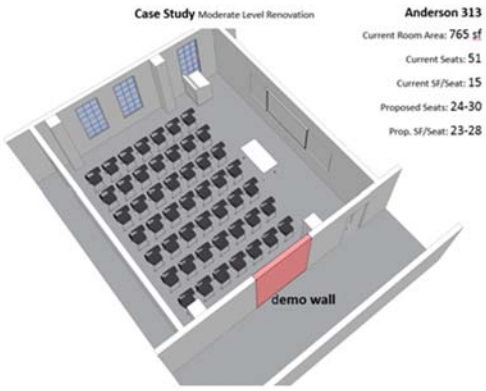
1. Minor Intervention	2. Minor Intervention + Furniture	3. Moderate Renovation
PRIORITY TIER 1		
▪ Bromfield Pearson (all classrooms) ▪ Aidekman 001, 002 ▪ Tisch Library 103, 223, 226 ▪ Halligan 116-122 ▪ Mayer Campus Center (add projection capabilities) ▪ Lincoln Filene Center	▪ Braker Hall (all classrooms) ▪ Miner Hall (all classrooms) ▪ Barnum 113, 114, 207 ▪ Pearson Chemical Lab 112 ▪ Halligan 108 ▪ Aidekman 09, 11, 12, 13	▪ Anderson 2nd & 3rd Floors ▪ Robinson Hall (all classrooms) ▪ Eaton Hall (all classrooms) ▪ Olin Hall (all classrooms) ▪ Tisch Library 3rd Floor
PRIORITY TIER 2		
▪ Dance Studio ▪ 26 Winthrop St. ▪ Dearborn House ▪ 97 Talbot Ave. ▪ Fine Arts House ▪ Eliot Pearson	▪ East Hall (all classrooms) ▪ Psychology Building 201, 301 ▪ Science-Tech Ctr 134, 135, 136 ▪ Jackson Gym 05, 06 ▪ 112 Packard Ave. ▪ Goddard 210, 310 ▪ Mugar 231, 235, 251F	▪ Paige Hall (all classrooms) ▪ Barnum 08, 104 (lecture halls) ▪ Pearson Lab 104, 106 (lecture halls)

Two case studies are provided below as illustrations of what may be involved in different types of renovations – **Case Study 1: Moderate Renovation**, and **Case Study 2: Minor Renovation + Furniture**.

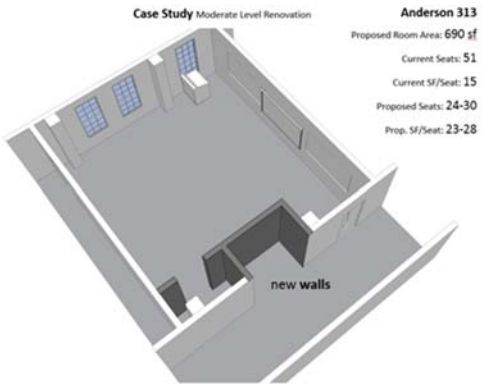
Case Study 1
Moderate Renovation – Anderson Hall 313

The g architectural renderings below show how a Level 3 renovation could be executed in Anderson Hall Room 313. Again, a Level 3 renovation includes all new finishes to floors, walls, and ceilings, as well as reconfiguration of partition walls to accommodate storage / informal learning areas, changes to lighting fixtures, electrical components, and new furniture.

The two renderings below document the structural changes to the room: notably the demolition of the front wall to create a study nook in the hallway outside the room, and a small storage room inside the classroom.



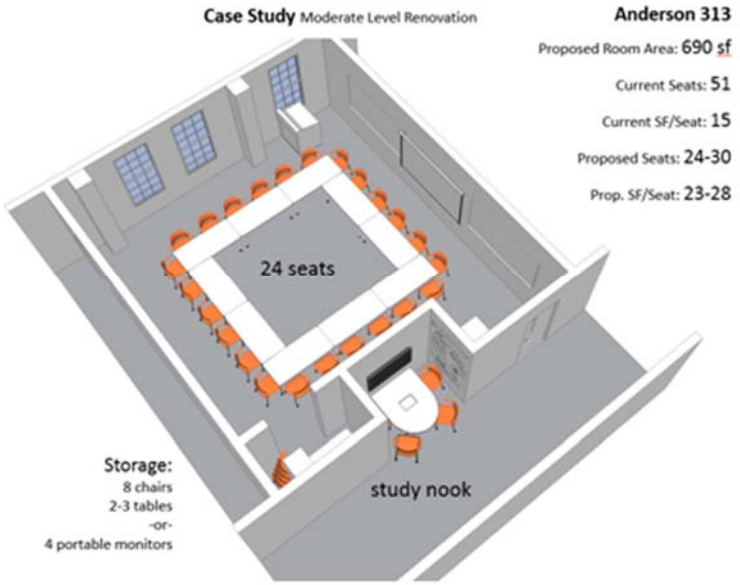
Demolition of wall



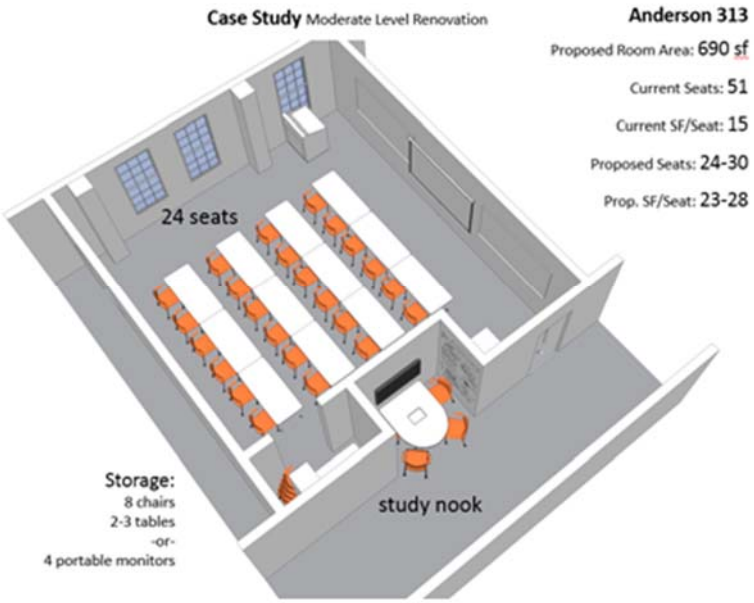
New walls added

Renderings below show four ways in which the room could be furnished to accommodate different pedagogies. Collectively, with flexible furnishings, the four proposed rooms could support seminar, lecture, group collaboration, and group collaboration with display pedagogical styles. Proposed configurations hold between 24 and 32, all within the recommended range of 20 to 30 square feet per seat.

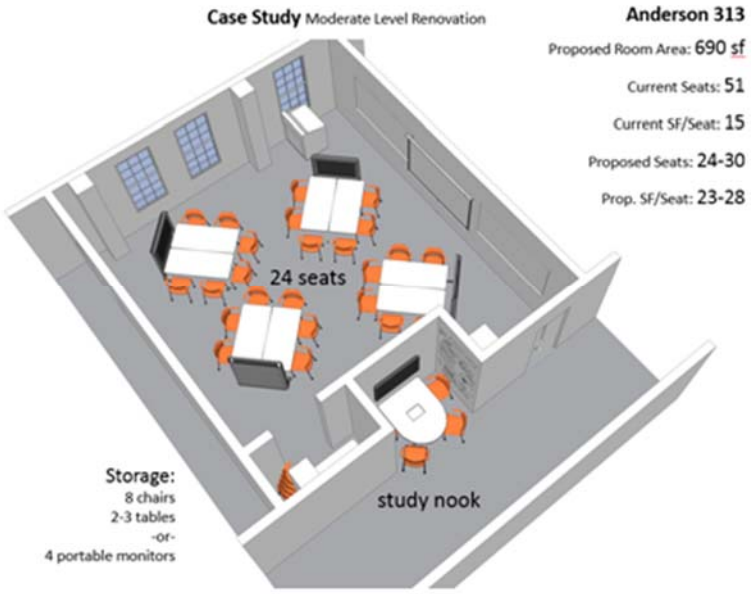
Seminar configuration
Movable tables and chairs are arranged in a square – 10 tables and 24 seats. (Additional tables and chairs are placed in the storage area in the classroom.)



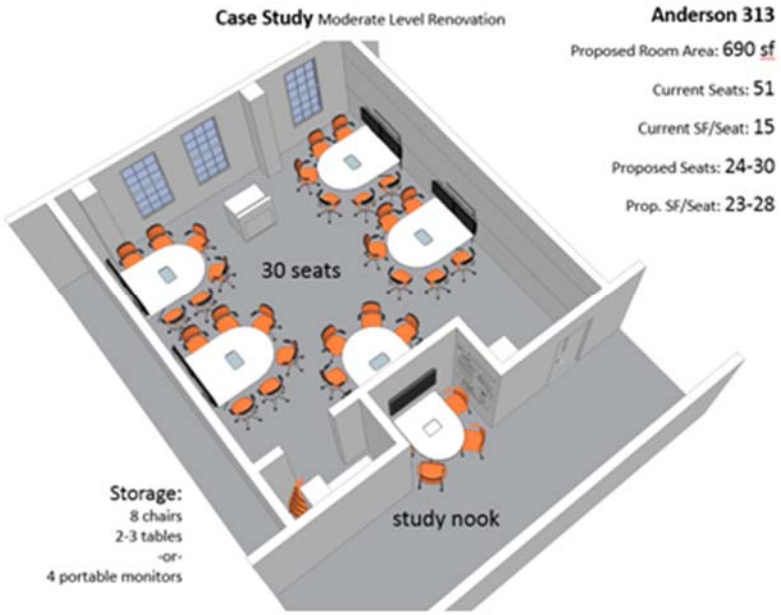
Lecture / General Purpose configuration
Movable tables and chairs are arranged in a rows facing front writing surfaces – 12 tables and 24 seats (2 seats per table).



Group Collaboration (with or without Display)
Movable tables and chairs are arranged in four groupings (2 tables per grouping). Each group accommodates 6 students (24 student total), with a portable monitor at the end of the table so that students can display their work. (Note: if a monitor is not needed, this configuration could accommodate 8 per grouping, or 32 students total.)



Group Collaboration with Display
In this configuration, the room is fit-out with semi-circular tables, each with a display monitor at the end of the table. With five tables of 6 students, the room accommodates 30 students in total. These tables are generally fixed in place.



Renovation of Third Floor of Anderson Hall to Include Multiple Room Types

The rendering below shows how each new type of room could be accommodated on the third floor of Anderson Hall, resulting in a variety of learning space types within the same building, as well as study nooks added at several points along the corridor.

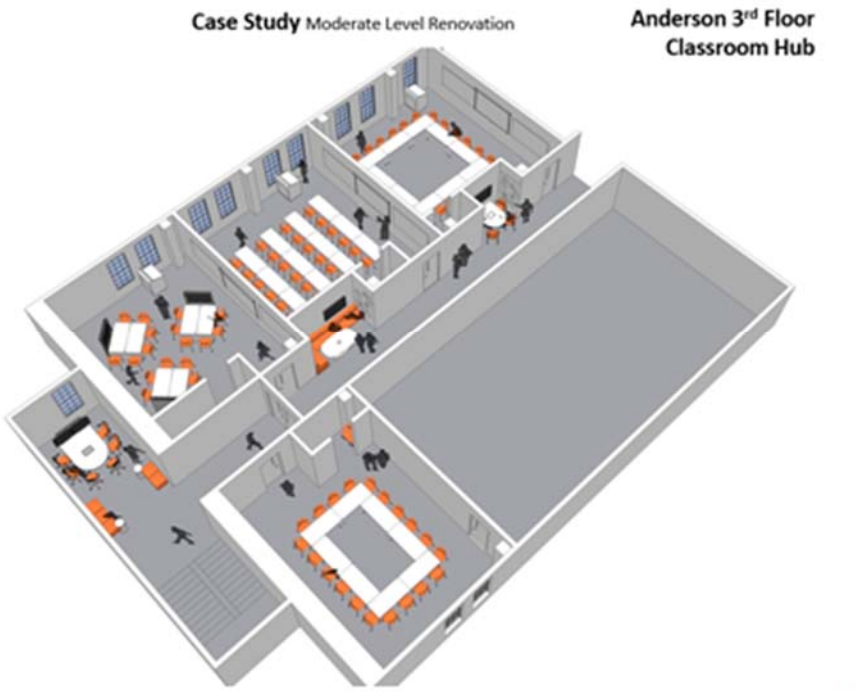


Chart 22 below summarizes current conditions and options for different room configurations post-renovation.

Chart 22.

Anderson 313 (Moderate Renovation)

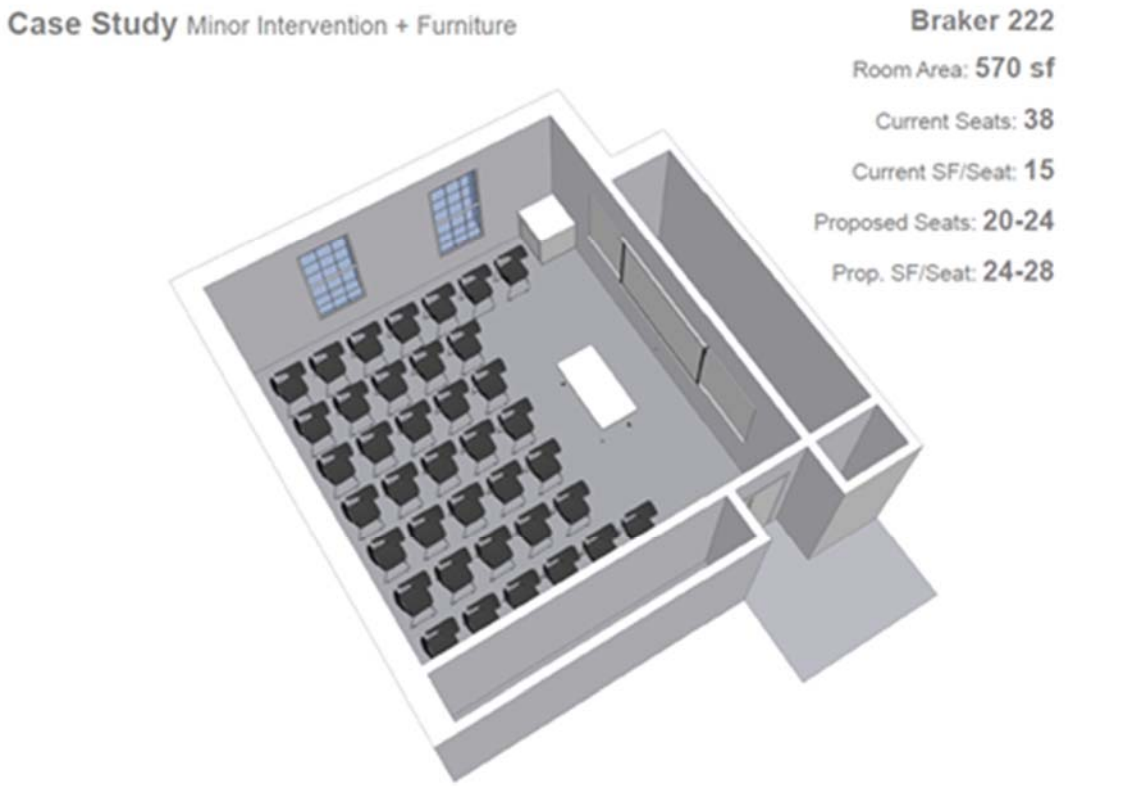
Current	Post-Renovation			
	Pedagogical Formats Supported	*Configuration*	*Seats*	*SF Per Seat*
▪ General Purpose Config	▪ Seminar	Square / doughnut	24	29
▪ Primarily lecture format	▪ Lecture / GP Classroom	Tables / chairs facing forward	24	29
▪ Tablet arm chairs	▪ Group Collaboration	4 groups of 8	32	22
▪ 51 seats	▪ Group Collab w/ Display	4 groups of 6 + monitor per group	24	29
▪ 15 SF per seat				

Plus:
- Storage area (8 chairs, 2 to 3 tables)
- Study nook outside room with monitor and white boards.

Case Study 2
Minor Renovation + Furniture – Braker Hall 222

A Level 2 renovation includes Level 1 activities (interventions such as patching/painting, lighting adjustments, new whiteboards, new blinds, etc.) as well as new furniture to meet current standards for seating density (assume 20 to 30 square feet per seat).

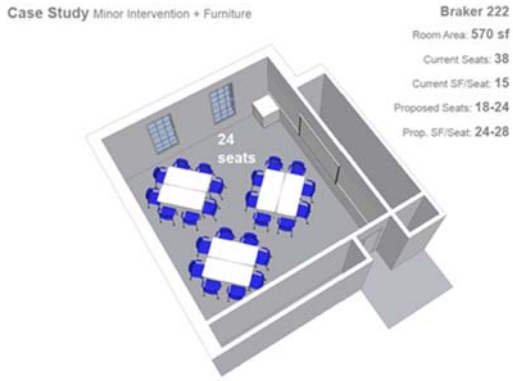
This is a modest work effort (i.e., about a day or so of labor) plus the cost of new furnishings – no changes in wall configurations. Tablet arm chairs would be replaced by moveable tables and chairs. The architectural rendering below shows Barker Hall Room 222 as it is currently – with tablet arm chairs at a 15 square feet per seat space allocation.



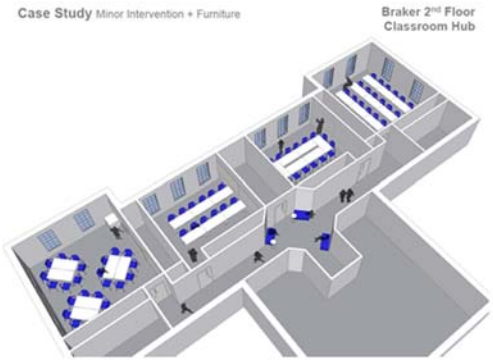
The renderings below show the impact of a Level 2 renovation. A simple change of furniture opens up the space, and makes it more flexible and conducive to different pedagogical formats. Instead of the room's current 38 seats, each new room has seating to accommodate between 18 and 24 students. In "rightsizing" the inventory these rooms now fit well within the 20 to 30 square feet per seat range and help address the demand for smaller classrooms.

Seminar

Lecture / General Purpose



Group Collaboration



Floor renovation with multiple room styles

Chart 23 below summarizes current conditions and options for different room configurations post-renovation.

Chart 23.

Braker 222 (Minor Intervention + Furniture)

Current	Post-Renovation			
	Pedagogical Formats Supported	***Configuration***	***Seats***	***SF Per Seat***
▪ General Purpose Config	▪ Seminar	Square / doughnut	20	29
▪ Primarily lecture format	▪ Lecture / GP Classroom	Tables / chairs facing forward	18	32
▪ Tablet arm chairs	▪ Group Collaboration	4 groups of 8	24	24
▪ 38 seats	▪ Group Collab w/ Display	4 groups of 6 + monitor per group	18	32
▪ 15 SF per seat				

AREA C
Transitioning from Presentation Technologies to Those that Support Student Participation

Technology is currently in a transition from an A/V, front-of-the-room focus to being more about the "flow" of the experience. It is no longer simply about projectors and slides but rather about interaction from one person to another and from one group to another. The implication for future technology planning and fit-out is more reliance on laptops, student-provided mobile devices, wireless and software than on proprietary hardware and cabling.

Tufts' focus on "media room types" is traditional. Current standards emphasize what components are in the system, not what one can do in a particular room. Newer technologies offer more powerful alternatives at a more cost-effective price point and with easier supportability.

Recommendation PT 4

Migrate from primarily hardware-based learning space technologies to software-based technologies that provide greater flexibility in using technology in learning spaces, and better options for technology upgrades and refresh cycles.

Tufts University should modernize its classrooms with technologies that support the leading edge of pedagogical styles. The following planning principles are recommended when contemplating renovation or new construction of any learning space.

Hardware and Software

Begin to phase out proprietary hardware AV switching equipment and replace it with software / IT network infrastructure solutions that handle audio-video playback and distribution either wirelessly between devices or using digital resources (files, DVD, media, or streaming from the cloud).

Develop or obtain software that will meet a defined set of active learning modalities and standardize on these across the campus to build communities-of-practice that use common toolsets. By standardizing software the university can create systems that are reliable, easy-to-use, and allow both faculty and students to know what they will be using in any classroom to which they are assigned.

Dual Screen Environments

Plan for **phased deployment of dual-screen environments** to support the increase instances of students sharing content to screens at the front of the classroom.

BYOD ("Bring Your Own Devices")

Today's modern devices allow for a new form of participation through technology that students can utilize via devices they bring to class. Rooms should provide multiple possible pathways for students to participate and interact within the class both with each other and the presenter, especially by **making it easy and possible to use BYOD technologies**. (The University should capitalize on the fact that students today are very familiar with using their devices for a wide range of uses, and adapt devices easily and quickly to new uses.) Supporting BYOD can allow students to search / access information, share information, co-create new content, manipulate content, and

capture / archive content. More use of BYOD technologies also makes it easier to teach from any location within the room.

Management and Operations

Design technology and supporting systems to be simple and reliable. Faculty (and students) should have confidence that the systems will perform as expected, and there should be a smooth starting up experience at the beginning of class. Acknowledging that errors do happen, system designs should make it simple and quick to recover from an error and provide easy transitions between teaching modes both between and within classes.

Assessment

Institute mechanisms for collecting and analyzing date to determine how effectively technology and supporting systems are used, and to allow for ongoing improvement.

AREA D
Providing Adequate Staffing for Technology

To ensure that classroom technologies are being used in their most efficient way, it is important to have a sufficiently staffed team that is ready to support classroom technologies. The Strategic Plan recommends a few options to ensure the capability of the tech team.

Recommendation PT 5

Centralize technology expertise and dedicate more resources to allow for sufficient staffing (internal and contract) to support new technologies.

Increase the current team size that supports classroom technologies

Add two internal positions to give the technology support team sufficient capability to assist faculty with technological issues. Further, cross-train existing support staff in various areas of instructional design, including coaching them in how to engage in substantive discussions of pedagogical approaches and needs when they are meeting with faculty.

Augment the technology team with contractors as needed

The University can consider long-term contractors to augment internal staff and outsourcing larger projects / early implementations all in an effort to accelerate the pace of bringing all classrooms to a basic technological standard.

AREA E
Funding to Modernize and Refresh Learning Spaces

Achieving the Strategic Plan goal of upgrading all learning spaces to a baseline quality level over five years will require a significant capital investment.

Recommendation PT 6

Allocate sufficient funding to invest in required physical and technology changes and upgrades over the next five years

Order-of-magnitude investments in physical infrastructure (from minor interventions to moderate renovations plus refurnishing) are estimated (order-of-magnitude) in the range of $6 million to $7 million over a five year period (2015 dollars). See *Chart 24* below.

Chart 24.
Order-of-Magnitude Renovation Costs, by Category and Priority

	1. Minor Intervention		2. Minor Intervention + Furniture		3. Moderate Renovation		Total	
HARD COSTS	*Per SF $10*		*Per SF $25*		*Per SF $100*			
	SF	**Cost Per SF**	**SF**	**Cost Per SF**	**SF**	**Cost Per SF**	**SF**	**Cost Per SF**
Priority Tier 1	12,700	$130,000	12,000	$300,000	34,600	$3,500,000	59,300	$3,930,000
Priority Tier 2	6,700	$70,000	8,400	$200,000	9,900	$1,000,000	25,000	$1,270,000
Total	19,400	**$200,000**	20,400	**$500,000**	44,500	**$4,500,000**	84,300	**$5,200,000**
Pct of Total		*4%*		*10%*		*87%*		*100%*
PLUS SOFT COSTS AT:								
30%		**$60,000**		**$150,000**		**$1,350,000**		**$1,560,000**
Total Cost		**$260,000**		**$650,000**		**$5,850,000**		**$6,760,000**

In addition to the costs of physical reinvestments, a range of investments in technology are also required. Baseline costs for technology were estimated for each room type that was defined in Area A of *"Section 2. 2 Strategic and Program Recommendations."* Two factors affect budget projections for technology costs: (1) the number of screens added for projection capability (single vs. dual, upgrades of existing vs. replacement with new) to support student group work and interactivity; and (2) whether installations are done in-house versus by outside integrators.

Chart 25 outlines costs, by room type, for screen options.

Chart 25.

Technology Cost Options, Per Room, By Scenario

1. Interactive Presentation		2. Project-Based Activities		3. Discussion with Remote Expert	
Dual-screen option	$ 19,500	Triple-screen option	$ 62,000	Dual-screen option	$ 22,000
Single-screen option	$ 15,000	Dual-screen option	$ 57,000	Single-screen option	$ 18,000
Upgrade to single screen with re-use of existing projector	$ 12,500	Upgrade to single screen with re-use of existing projector	$ 55,000	Upgrade to single screen with re-use of existing projector	$ 16,000
4. Follow-up from Field Experience		**5. Informal Team Areas**		**Simple System (Comp to Tier 1)**	
Dual-screen option	$ 19,500	Single-screen option	$ 5,000	Dual-screen option	$ 14,780
Single-screen option	$ 15,000			Single-screen option	$ 9,980
Upgrade to single screen with re-use of existing projector	$ 12,500			Upgrade to single screen with re-use of existing projector	$ 8,100

Chart 26 presents cost projections over five years for technology additions and upgrades based on assumptions about investments in screens, numbers of rooms upgraded, and use of in-house staff versus an integrator. The five year cost range is between $3.2 million and $4.7 million (2015 dollars).

Chart 26.

Cost Projections for Technology Additions / Upgrades

Pedagogy and Type of Technology	Cost Per Room	No. of Rooms		Total Cost			
		Low Estim	*High Estim*	*Low Estim*		*High Estim*	
1 Interactive Presentation OR							
3 Discussion with Remote Expert							
4 Follow-up from Field Experience							
Dual-screen option	$21,000	6	14	$ 126,000		$ 294,000	
Single-screen option	$17,000	72	58	$ 1,224,000		$ 986,000	
Upgrade to single screen reusing existing projector	$14,000	35	55	$ 490,000		$ 770,000	
		113	127	**$ 1,840,000**		**$ 2,050,000**	
2 Project-Based Activities							
Triple-screen option	$62,000	0	2	$ -		$ 124,000	
Dual-screen option	$57,000	2	10	$ 114,000		$ 570,000	
Upgrade to single screen reusing existing projector	$55,000	6	10	$ 330,000		$ 550,000	
		8	22	**$ 444,000**		**$ 1,244,000**	
5 Informal Team Areas							
Single-screen option	$ 5,000	40	65	**$ 200,000**		**$ 325,000**	
Rooms with No Change		99	46				
Total Hard Costs		260	260	**$ 2,484,000**	to	**$ 3,619,000**	
OPTION A: Installation by Outside Integration Firm							
Plus: Soft Costs(assuming outside integrator) @	30%			**$ 745,200**		**$ 1,085,700**	
Total Project Costs				**$ 3,229,200**		**$ 4,704,700**	
OPTION B: Installation of Smaller Scale Projects by Internal Staff, Augment with Integration Firm							
Plus: Internal Staff Positions @	2			**$ 300,000**		**$ 300,000**	
Plus: Soft Costs(assuming outside integrator does 25% of Scen 2 rms) @	30%	25%		**$ 93,300**		**$ 97,500**	
Total Project Costs	rooms handled by integrator			**$ 2,877,300**		**$ 4,016,500**	

Total Investment in Learning Spaces

As *Chart 27* illustrates, the annual potential investment in learning spaces – to address both physical changes and technology upgrades – is estimated in the range of $2 million to $3 million, or roughly a total of ~$11 million to $13 million over a five year period (2015 dollars). This assumes an outside integrator is used for technology installations, which offers the potential for some cost savings.

Chart 27.

5 Year Plan Summary: Annual Investments in Learning Spaces

	5 Year Costs	Year 1	2	3	4	5
PHYSICAL						
Total	$7,000,000	$ 1,400,000	$ 1,470,000	$ 1,544,000	$ 1,621,000	$ 1,702,000
TECHNOLOGY						
Low Estim	$3,229,200	$ 646,000	$ 678,000	$ 712,000	$ 748,000	$ 785,000
High Estim	$4,704,700	$ 941,000	$ 988,000	$ 1,037,000	$ 1,089,000	$ 1,144,000
TOTAL						
Low Estim		**$ 2,046,000**	**$ 2,148,000**	**$ 2,256,000**	**$ 2,369,000**	**$ 2,487,000**
High Estim		**$ 2,341,000**	**$ 2,458,000**	**$ 2,581,000**	**$ 2,710,000**	**$ 2,846,000**

Section 2.4: Scheduling Recommendations

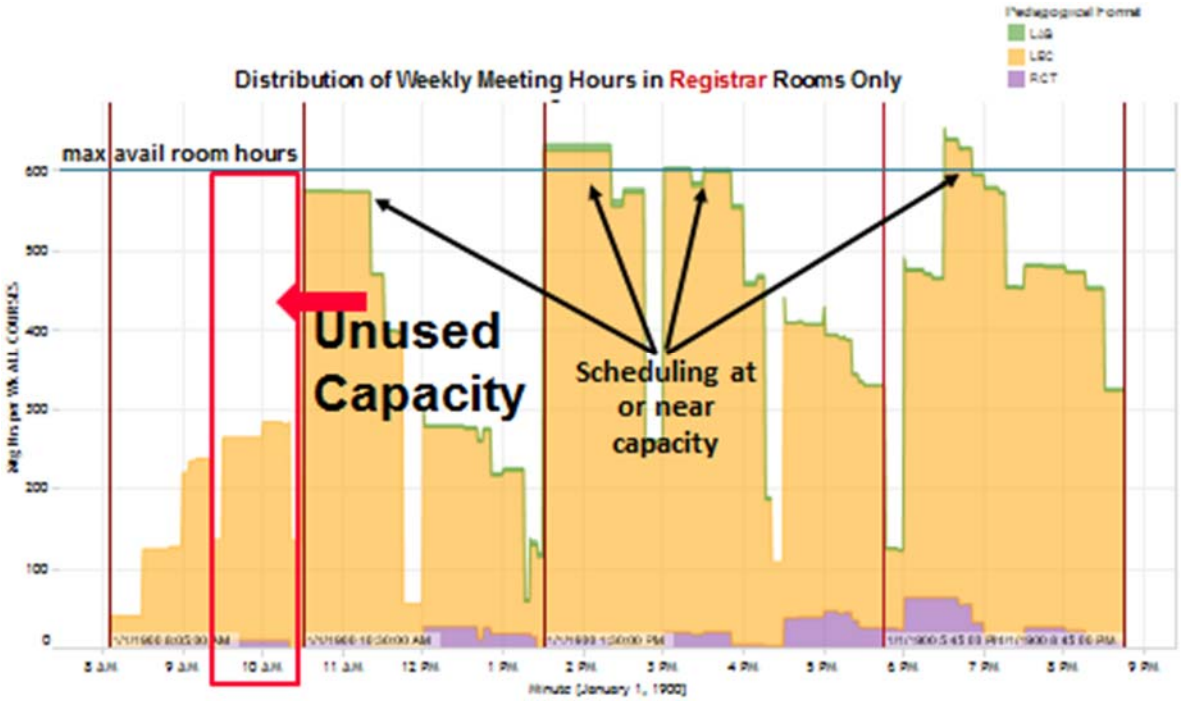
Like many other campuses, Tufts has a group of learning spaces that are managed and scheduled by the Registrar, and then a variety of spaces that are departmentally scheduled. Utilization analyses revealed some marked differences in the way that Registrar versus non-Registrar rooms are scheduled, as well as some periods of low room utilization. Scheduling recommendations focus on policy changes (especially opportunities for increasing room utilization) to make better use of learning spaces / classroom resources. Recommendations are in two areas:

- Capturing under-used scheduling capacity in Registrar rooms
- Capturing more complete information on scheduling and use of non-Registrar rooms

AREA A
Capturing Under-Used Scheduling Capacity in Registrar Rooms

Overall Tufts does a relatively good job utilizing its rooms when compared to its peers. Tufts daytime room utilization is 46% (for Registrar rooms) and its schedulable day lasts 9.7 hours – both good metrics in comparison to other institutions. However, as Chart 28 shows, there is under-used capacity. The chart maps meeting hours per week at various times of the day for all courses in Registrar rooms. Scheduling peaks at a few times during the day (mid-morning; afternoons between 2pm and 4:30pm, and in the evening hours). Conversely, scheduling activity is low in the morning (between 8:00am and 10:20am).

Chart 28.



Recommendation SC 2

Schedule more intensively in the 9:30am to 10:20am schedule block.

Across the nation, the 8:00am hour is traditionally unpopular for classes (both with students and faculty), and there is often strong resistance to increasing scheduling activities at that time. However, many institutions consider 9:00am or 9:30am the "actual start" of the scheduling day. Tufts should explore options for scheduling more intensively in the 9:30am to 10:20am time period. In particular, it can start by looking at peak periods of the day, where pressure on rooms is greatest, and evaluate whether any courses in peak times might be moved to the 9:30am to 10:20am time block.

Recommendation SC 3

Enforce the "Only 55% in Prime Time" scheduling policy more consistently, which would also encourage greater use of the 9:30 am to 10:20am block.

A corollary to the issue of low scheduling in the 9:30am to 10:20am hour is "over-scheduling" during "Prime Time" – the hours between 10:00am and 3:50pm. Prime Time is traditionally a period in high demand. To attempt to manage demand during Prime Time, Tufts has a "55% prime time" scheduling policy in place. That is, a department should not schedule more than 55% of its meeting hours in prime hours between 10:00am and 3:50 pm. The reality is that many departments exceed this percentage, and in some cases significantly so. (At least 36 of Tufts departments schedule more than 55% of section meeting hours in Prime Time.)

Enforcing the 55% Prime Time policy more stringently would decompress intensive scheduling during peak times and drive more usage of early morning hours, as sections would have to find time slots out of Prime Time to move to.

If just the 9:30am to 10:20am time period were scheduled as intensively as the 11am hour, Tufts would gain approximately 300 schedulable meeting hours - at approximately three hours per class that equates to 100 additional courses.

Recommendation SC 4

Limit the "home court advantage" to smaller learning spaces, with larger spaces (~60+ seats) fully schedulable by the Registrar and accessible to the entire University community.

Notwithstanding that more than 75% of Tufts classes are small (enrollments of 25 or fewer), there is still a need for an inventory of large classrooms and auditoria to accommodate large (60 to 100 students) or very large (over 100) classes offered at Tufts. Owing to size, options for scheduling these classes are limited, and when smaller courses are placed in larger rooms (as sometimes happens in buildings where a department has a home court advantage), this reduces the ability to accommodate larger courses. Accordingly, learning spaces with 60 or more seats should not be subject to the home court advantage policy.

AREA B
Capturing More Complete Information on Scheduling and Use of Non-Registrar Rooms

In utilization analyses, the amount of scheduling in non-Registrar rooms was computed, and shown to be ~18% during daytime hours. Although this figure is exceptionally low, it must be acknowledged that only formally scheduled classroom activities are generally recorded in the University's scheduling database (EMS); most other events that occur in non-Registrar rooms (e.g., departmental meetings, guest lectures, thesis-related meetings, etc.) are not recorded. The result is an unclear picture of how non-Registrar rooms are used.

Recommendation SC 4

Include non-Registrar rooms – like Registrar rooms – in the EMS scheduling system, so that complete information on their use (for regularly-scheduled classes and ad hoc events) is available.

The recommendation is to use the EMS system to capture all or most scheduling activity in non-Registrar rooms in order to obtain a truer picture of their current use. Aside from being able to use these rooms for more scheduling activities, there are other benefits as well:

- For public safety, it is important to know who is where on campus in an emergency situation.
- Having hard data on the use of non-Registrar spaces for activities outside of classes gives a true picture of how these rooms are used, and the need for them.
- Having a comprehensive, complete dataset that includes non-Registrar rooms facilitates development of efficient and coordinated building maintenance, repair, and renovation activities for all rooms, not just Registrar rooms.

Section 2.5: Process and Management Recommendations

Process and management recommendations identify actions to improve the function and operation of learning spaces, and ongoing planning for them. Recommendations offered in this area relate to:

- Ongoing management of learning spaces
- Implementing improved processes for managing, budgeting, maintaining, and planning learning spaces.

AREA A
Ongoing Management of Learning Spaces

The Learning Spaces Strategic Plan provides recommendations that affect many facets of learning spaces – e.g., scheduling policies, modernization and upgrades to rooms, new approaches for technology fit-out and management, etc. To implement these recommendations effectively, and to be able to use learning spaces better, management and oversight of learning spaces needs to be better coordinated on campus. To this end, the Strategic Plan proposes a new framework for ongoing management of learning spaces.

Recommendation PM 1
Adopt a new framework for ongoing management of learning spaces.

Tufts should create two entities that have specific and non-overlapping responsibilities for learning spaces – one entity working at the strategic level, the other at the operational level. With working titles, they are proposed as follows:

- **Learning Spaces Strategy Group.** This group is comprised of senior decision-makers whose role is to make strategic decisions that will guide actions taken to manage and improve learning spaces over time.
- **Learning Spaces Working Group.** This group is comprised of decision makers who are empowered to carry out strategies and priorities that the Strategy Group sets for the learning spaces, and to ensure good operation and management of learning spaces.

Chart 30 below presents preliminary recommendations for staffing the Learning Spaces Strategy and Working Groups. Each group should include individuals that represent the following key stakeholders and / or functional areas pertaining to learning spaces: (1) schools and central administration, (2) planning, (3) scheduling, (4) technology and (5) pedagogy.

Chart 30.

Proposed Staffing for Learning Spaces Groups

	Learning Spaces	
Functional Area	**Strategy Group**	**Working Group**
Central Admin / Schools	▪ Provost / Deans	▪ Associate Deans
Planning	▪ VP Operations	▪ Campus Planning ▪ Facilities
Scheduling	▪ Registrar	▪ Scheduling
Technology	▪ VP / CIO	▪ TTS ▪ Library (DDS)
Pedagogy	▪ Classroom Committee Rep ▪ Student reps	▪ CELT ▪ ESTS ▪ Other groups?

Learning Spaces Strategy Group

Decisions of the Learning Spaces Strategy Group generally focus on resource allocation, budget priorities and alignment of learning spaces with pedagogical interests and directions. Specific responsibilities that are necessary to implement recommendations in the Strategic Plan are listed below. (Other responsibilities can be added over time, of course, as additional needs arise.)

- **Aggregate and centralize existing budgets.** Given that funding currently comes from several different sources, the degree and nature of centralization will be a matter of discussion for the Strategy Group. (*Recommendation PM2* below addresses this more fully.)
- **Appropriate additional funding as required and informed by the Strategic Plan.** The Strategic Plan estimates a need for an investment in the range of ~$11 million to $13 million over the next five years to modernize and refurnish learning spaces, and to enhance existing technology. The Strategy Group should determine what funding can be made available and over what time period. Ideally, the Strategy Group should develop a long-range budget (e.g., 5 years) and funding sources, so that expenditures can be anticipated and planned for.
- **Set broad goals for upgrading and augmenting learning spaces.** Given the magnitude of investment recommended in the Strategic Plan, it may well be that resource limitations require prioritization of investments proposed in the Plan. It will be the job of the Strategy Group to review Strategic Plan recommendations against funding availability and other institutional priorities and make definitive decisions about how much investment is possible, and in what aspects of the learning spaces.
- **Implement major scheduling policy changes.** Some of the Strategic Plan recommendations are low-cost but potentially high impact in creating better use of learning spaces (e.g., setting and adhering to room capacities; enforcing the "no more than 55% in Prime Time" scheduling requirement; promoting better use of the 9:30am

to 10:20am hour; etc.). The nature of some of these recommendations means a significant change in the status quo, and may meet with resistance in some quarters of the institution. It will be the job of the Strategy Group to evaluate the degree to which policy recommendations are adopted, and to communicate the rational for such recommendations (e.g., how they align with institution priorities and / or resources).

- **Make strategic decisions about how best to align evolving pedagogies with technologies required to support them.** Tufts faculty are clearly moving toward more interactive learning modalities, in keeping with a broader national trend in early 21st century learning. Tufts' existing technologies are "front-of-room" focused and rely heavily on hardware. New technologies that support more interactive modalities tend to be more software-based and dispersed, especially taking advantage of opportunities for a student to "bring your own device" (BYOD). In the long-run, this may present some cost-savings for the institution, but in the short-term, significant investments are required to move from hardware to software-based solutions. Based on resources available, the Strategy Group will have to make decisions about the extent to which learning spaces can be realigned so that in-room technologies can better support more interactive pedagogies.

Learning Spaces Working Group / Design Team

Specific responsibilities of the Learning Spaces Working Group that are necessary to implement recommendations in the Strategic Plan are outlined below. (Other responsibilities can be added over time, of course, as additional needs arise.) *Area B* below provides more detailed recommendations on implementation of these functions.

- **Develop integrated annual plans for reinvestments in learning spaces.** The Strategic Plan provides a road map for reinvesting in learning spaces, and using that road map the Strategy Group will set priorities and budgets for reinvestment ideally over a 5 year time horizon. The job of the Working Group is to "operationalize" a five year plan by creating a series of annual plans specifying what happens in each year – e.g., which rooms are to be rightsized and / or refurnished, which rooms will have other physical changes, where will investments in technology be made, at what level, etc. An important responsibility of the Working Group will be to ensure that in each annual planning cycle, all areas that touch learning spaces are brought into the fold when considering what types of investments to be made and how funds should be allocated. (*Recommendation PM3* below addresses this more fully.)
- **Address operational and management issues associated with learning spaces.** Research during the Learning Assessment project revealed the disaggregated way in which classrooms are managed and cared for. The Strategic Plan recommends a more integrated approach, which is the job of the Working Group to develop and implement. (*Recommendation PM4* below addresses this more fully.)
- **Develop ongoing assessment tools and processes.** Through the Learning Spaces physical assessment, Tufts has made significant inroads in gathering comprehensive data on the fit-out and conditions of learning spaces. The Working Group should ensure that assessments continue on a regular basis, datasets are maintained, etc., so that Tufts can continue to evaluate impacts of changes and have good data to inform future planning and investments. (*Recommendation PM5* below addresses this more fully.)

AREA B
Implementing Improved Processes for Managing, Budgeting, Maintaining and Planning Learning Spaces

Certain aspects of operating and maintaining learning spaces at Tufts, as at many other institutions, are decentralized. Recommendations below are intended to improve the ability of the University to manage learning space resources more effectively.

Recommendation PM 2
Combine all existing budgets related to learning spaces.

Entities that provide some type of funding for learning spaces include the Office of Facilities (it has no dedicated classroom budget, but attempts to address deferred maintenance when possible); individual Schools (which contribute funding for technology or other upgrades, but not within the construct of a long-term plan for funding these spaces); and individual departments (largely for specific learning spaces within a departmental area).

Tufts should augment existing budgets, as required per recommendations of the Strategic Plan, and ensure adequate dedicated funding for (1) furnishings, (2) technology refresh, and (3) ongoing operations. Because funding at present comes from different organizational areas on campus, the Learning Spaces Strategy Group should evaluate how best to orchestrate and coordinate available funding sources so that monies spent on learning spaces can be deployed to maximum effect. This likely means centralizing spending decisions (if not actual budget appropriations) in one entity that has the "big picture" perspective on learning spaces (the proposed Learning Spaces Working Group), and can make informed judgments and recommendations about how and how much monies are spent on learning spaces.

Recommendation PM 3
Develop an integrated planning process and annual program plans for renovations and capital projects.

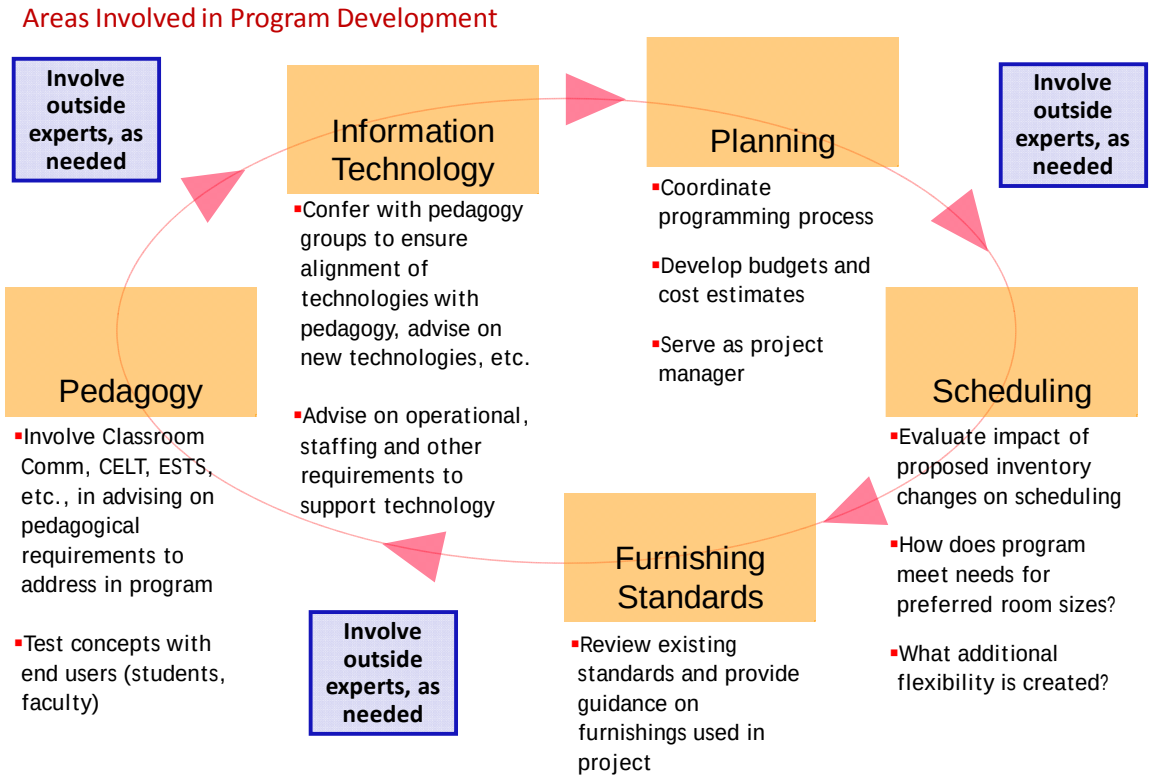
An integrated planning process is one in which all elements that affect learning spaces are considered, whether planning for maintenance, renovation or new construction. The Learning Spaces Working Group should lead the integrated planning process.

The starting point for an integrated planning process and annual program plans is the Strategic Plan, which states as a guiding principle to create more flexibility in learning spaces through greater use of movable furnishings and more software-based technologies. The Strategic Plan also includes recommendations for specific room and building renovations and upgrades.

Once the Learning Spaces Working Group understands the funding that will likely be available over the coming five years (from the Strategy Group's budget plan), it should review and refine the Plan's recommendations based on anticipated funding and begin to develop annual plans. Its role is to serve as orchestrator and coordinator of all the areas involved in developing annual plans. The schematic below identifies five major areas – (1) pedagogy, (2) information technology, (3) planning, (4) scheduling and (5) furnishing standards.

Chart 31.

Developing the Annual Program of Changes to the Learning Space Inventory



- **Pedagogy.** Planning should start with an understanding of current and anticipated pedagogical requirements that need to be accommodated in learning spaces. The group's members representing pedagogical interests should communicate pedagogical needs and advancements as expressed from individual faculty and from various organizations (e.g., CELT, ESTS, etc.).
- **Information Technology.** Individuals representing pedagogical and technology interests on the Working Group should work together to ensure that learning space technologies are in sync with evolving pedagogies.
- **Furnishing Standards.** As plans are developed for individual upgrades, renovations, etc., the Working Group should refer to standards developed as part of the Strategic Plan when evaluating and selecting furnishings. From time to time, the Working Group should evaluate these standards and modify them as required.
- **Planning.** As an annual plan develops, the Working Group should also coordinate with Tufts' Office of Campus Planning, which will oversee implementation of specific projects and all the attendant activities (selection of contractors, obtaining cost estimates, scheduling, etc.).
- **Scheduling.** The role for representatives from the Registrar's Office on the Working Group is to evaluate how changes to the inventory may affect scheduling, particularly as rooms are rightsized downward and seat capacity is diminished. During the planning stages, the Registrar's Office should do test runs of the schedule with the proposed inventory to assess the impact of changes, and to ensure that there is adequate capacity to accommodate larger classes.

From the perspective of project flow, an annual plan has three major phases:

- **Identify classroom needs.** Determine what classroom upgrades should be made, identify needs for additional classroom space and any other learning space needs.
- **Develop program for upgrades and improvements.** Examine and coordinate input from all relevant perspectives represented on the Learning Spaces Working Group. (This is an iterative process, with representatives meeting on and discussing various issues and perspectives.) Once consensus is reached, finalize the program of changes for the year, and present to Learning Spaces Strategy Group for final approval and budgetary authority.
- **Implement proposed changes.** The Learning Spaces Working Group should monitor implementation of proposed changes to ensure compliance with defined standards, program objectives, etc.

Recommendation PM 4

Develop a single approach and standards for learning spaces maintenance and upkeep.

At present, beyond general room cleaning by facilities maintenance staff, there is no single approach by which learning spaces are maintained and kept in basic working order – e.g., ensuring that chalk or markers are available, monitoring to ensure that rooms and writing surfaces are cleaned on a regular basis, maintenance issues and problems are identified in a timely fashion, etc.

Because learning spaces are spread widely across buildings and parts of campus, the University should adopt a hybrid approach to upkeep and maintenance whereby maintenance and operating standards are developed centrally but implemented locally.

Centralized Activities

The Learning Spaces Working Group should spearhead activities for learning space operations, maintenance and upkeep that should be centralized for consistency. Largely, these activities would center on creation of consistent standards and protocols, e.g.

- Standards for basic functionality of rooms (e.g., board cleaning, chalk / markers and other basic room supplies, clock maintenance, etc.)
- Creation of consistent instructions and guidelines for processes occurring in learning spaces (e.g., expectations regarding room reconfigurations, coordination with TTS on technology usage guidelines)
- Instructions and checklists for individuals overseeing daily operation of learning spaces in the field.
- Administrative processes for communicating needed repairs and maintenance.

Decentralized Activities

Because of the high level of activity that occurs in learning spaces from time period to time period within a day, there is no practical way to monitor changing conditions in classrooms centrally. Accordingly, the Learning Spaces Working Group should evaluate and recommend a system that provides an on-site presence in every major building with responsibility for immediate on-site needs and problems that arise in a learning space. (In the past, where Tufts departments had a significant presence in a building, some designated "Building Curators" whose responsibilities included classroom trouble-shooting, but the position did not extend to all buildings with learning spaces.)

This position would logically be an administrative staff person already working in the building, who would take on the additional responsibility of serving as a point-of-contact / troubleshooter for learning spaces. Duties associated with this position could include the following:

- Maintaining a small inventory of markers, chalk and other basic room supplies..

- Basic knowledge of room technology, to be able to assist with minor technology problems (TTS would still be called for more significant problems).
- Periodic review of classroom spaces (e.g., weekly or monthly) to assess conditions and alert Facilities or other groups to problems that may need fixing.
- Other minor tasks associated with learning spaces that may arise.

It should be stated that individuals performing this function will be drawn from staff who already have other full-time responsibilities, so duties in "learning space curatorship" should be kept to a minimum. Assuming this approach is adopted, the Learning Spaces Working Group should oversee the development of a manual for these staff members that lays out their responsibilities, offers guidance for performing their tasks, etc.

Recommendation PM 5

Institutionalize ongoing learning spaces assessments.

Through the Learning Spaces physical assessment, Tufts has made great inroads into understanding the nature and condition of its learning spaces in great detail. A comprehensive database now exists that includes information on a wide range of classroom elements (e.g., room "basics", environmental quality and conditions, layout and furnishings, technology capability, lighting, wireless access, etc.). Ideally, information on specific learning spaces should be updated in the database whenever changes are made – e.g., if new furniture is installed, the database should be updated with furnishing type and new seat counts. At a minimum, the database should be updated annually.

The Learning Spaces Working Group should determine what staff is required to support the ongoing maintenance and use of learning spaces assessment data, including resources necessary to administer the annual survey, maintain and update the database, and provide analytical reporting of information included in the database.

APPENDICES

Appendix 1
Learning Space Assessment Tool

[FORTHCOMING]

Appendix 2
Findings from Learning Space Assessment

[TO BE INCLUDED AS AN ELECTRONIC ATTACHMENT]

Appendix 3
Furnishing Standards

Formal Learning Spaces

To meet a variety of user objectives and to support the next generation of learning spaces, furnishings at Tufts should be:

- **Durable.** In addition to the normal wear and tear that is seen with classroom furniture, the flexibility and adaptability of the next generation of learning spaces demands that the furniture be constantly re-configured. This results in a higher level of abuse.
- **Modular.** The furniture must work well in the entire range of classroom modalities.
- **Storable.** The furniture must be capable of stacking and/or nesting together to facilitate efficient storage.
- **User Friendly.** The furniture must be intuitive and capable of being moved/manipulated by the users (faculty and students) without requiring the assistance of facilities staff

Tables

Tables should be approx. 5'-0" X 2'-0" (allowing two students to sit comfortably side-by-side) with lockable casters and a collapsible top. When the top is folded down, the tables should be capable of nesting together to facilitate storage. Table legs should not extend beyond the edges of the top in order for the tables to be placed together either side-by-side or end-to-end. Table edges should be neoprene or another resilient material to resist damage from tables being pushed together.
Product example: Pirouette Table by KI or equal

Chairs

Chairs should have arms as well as casters and be stackable. The arms should be positioned to allow the chair to slide underneath the table top. Seat and seat back should be non-fabric to allow for ease of cleaning.
Product example: Caper Stacking by Herman Miller or equal

Media Table

Media Table should be capable of accommodating up to six people with a flat screen monitor at one end. Table should be able to be placed against the wall or back-to-back with another media table. Power outlets should be accessed at the center of the table surface with one main "pigtail connection" that powers the entire table through an outlet on the wall or the floor.
Product example: Media:scape by Steelcase or equal

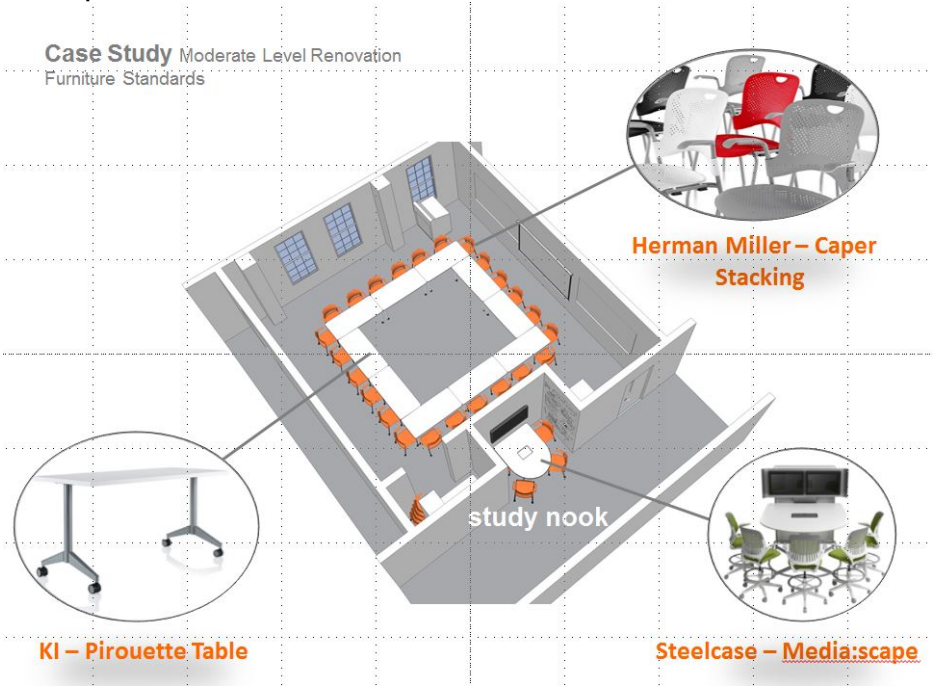
Informal Student Collaborative Study Space

This space can be thought of as a "kit of parts" that can be easily configured and reconfigured by students. Key to the success of this space is an acceptance of a level of messiness that comes with an active and kinetic form of working and studying together. The same furniture types – chairs on casters, modular 2' X 5' tables – used in the classroom spaces can be utilized in this space, however the table top surface should be a more durable material that is accepting of students cutting, marking, gluing, etc.

Whiteboards and tackable surfaces are critical in this space. Whiteboards should be both fixed on the wall as well as portable. Tackable surfaces should be mounted to acoustic batting in order to serve double duty as a sound absorption strategy – a critical aspect for the success of the space.

Access to power is also critical and best solved by a simple grid of power outlets in the floor or, if existing conditions do not allow for this, a grid of ceiling mounted pull-down cords. The space should be a wireless environment with ceiling mounted projectors and multiple projection screens that define study zones within the larger space.

Examples of Furniture Products



Features of Flexible Learning Spaces