Research Case Study:
Design for Learning Spaces
in Higher Education

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Background

The field of higher education faces many challenges, primarily driven by sweeping changes in how technology is used in the learning process, and by an expansion in the variety of learning styles favored by students. These trends are influenced by the large influx of Generation Y students, with their penchant for collaboration and constant communication, and by the widespread use of personal computing and communication devices. Further, competition to attract top students has never been greater, presenting the challenge of how to design learning spaces and deploy technology to positively influence the institutional brand and image to current and prospective students. Together, these forces are changing how learning spaces should be designed to best support the learning experience.

To this end, Knoll conducted a research project with a higher education institution to evaluate the effectiveness of its current learning spaces and to provide guidance for re-design. The intention of this case study is to share the issues we studied, the methods and tools used, and, most importantly, the performance guidelines for design of learning spaces developed as a result of this project.

The Setting

Since 1995, the school in the case study has tripled its number of students, faculty, and research dollars. The current building is 20 years old, (see Figure 1, left) has limited flexibility, and offers minimal support for collaboration among faculty, and between faculty and students. The teaching spaces neither support multiple teaching and learning styles nor reflect the expectations of Generation Y students or younger faculty for technology and learning environments. Moreover, the current facility has limited effectiveness as a tool to convey the message and brand to prospective students and faculty. A new nine-story building and a glass bridge will link the two structures (see Figure 1, right). The new building will have technologically sophisticated "smart" classrooms, three floors of wet laboratories, offices, conference space, and a 250-seat auditorium. It will be built to meet silver LEED (Leadership in Energy and Environmental Design) requirements.

Figure 1:
View of current facility (left) and new building construction (right)

Purpose

This study provided the school administration with an evaluation of current classroom spaces, furnishings and technology in terms of how these factors support effective teaching and learning—from both the teachers' and students' perspectives. In addition, we conducted analyses to determine which design features influence teaching quality outcomes and quality of the student learning experience.

Key Findings: Design Capabilities for Effective Classrooms

The results of this study show that the quality of the teaching and educational experience for students and faculty depends largely on the flexibility of the classroom space, the ability to reconfigure classroom furnishings, and the ability to reconfigure technology within the classroom space.

Flexibility and reconfigurability are directly linked to the quality of the teaching and educational experiences

Methods

Classroom Design and Technology Assessment

In this project, we designed and deployed two separate electronic surveys, gathering responses from 92 faculty and 295 graduate students on the following topics:

+ Type and frequency of different teaching and learning styles

+ Type and frequency of use of classroom technology

+ Functional design assessment of classrooms

+ Classroom technology assessment

+ Classroom comfort and aesthetics

+ Flexibility and adjustment of classroom features and technology

Faculty and student demographic data were also collected: job level, year in school, gender and generational affiliation.

Outcomes

We collected survey responses on a variety of outcomes related to teaching effectiveness and quality of learning experience:

+ Quality of communication among students; and between students and faculty

+ Quality of collaboration among students; and between students and faculty

+ Level of student and faculty engagement with the school (sense of belonging, commitment, etc)

+ Quality of the "image" conveyed by the school to faculty and students

Analyses

We used a statistical technique called "multiple regression" to reveal relationships between design features, furnishings, and technology, and the outcome measures. We included demographic characteristics of the population (generational affiliation, job level, gender, year in school) in these analyses.

Explanation of Multiple Regression Analysis

Multiple regression allows us to identify which variables actually predict an outcome in the real world. In this report we apply multiple regression to show the real, predictive relationships between classroom space design features, furnishings and technology characteristics, and outcomes such as student and faculty collaboration, engagement, and communication. Multiple regression is a powerful analysis technique that can reveal facts about relationships between variables that are difficult or impossible to detect with other types of analyses.

Results

In this section we provide a summary of the results of the multiple regression analysis of the survey data. The goal of these analyses is to identify which features of classroom spaces and technology are related to quality of the learning experience.

Both professors and students must be able to "control" the physical classroom effectively in order to produce a successful teaching and learning experience.

The results of this study show that the quality of the teaching and educational experience for students and faculty depends largely on the flexibility of classroom space, the ease of reconfiguration of classroom furniture, and ease of reconfiguration of classroom technology. Both professors and students must be able to "control" the classroom environment effectively in order to produce a successful teaching and learning experience.

Primary Influences

1. **Flexibility of Classroom Space:** The analyses show that the capability of classroom spaces to support different teaching styles is a significant predictor of student engagement, communication, collaboration, image, and making students feel valued. Thus, these results show that the more flexible the classroom space is in terms of supporting different teaching styles, the better the level of student engagement, communication, collaboration, student feelings of being valued, and the school conveying the right image to students.

2. **Ease of Reconfiguration of Classroom Furniture:** The analyses show that ease of reconfiguration of classroom furniture is a significant predictor of: student engagement, communication, and collaboration. Thus, these results show that the easier it is to reconfigure classroom furnishings, the better the level of communication between students, collaboration, and student and faculty engagement with the school.

3. **Ease of Reconfiguration of Classroom Technology:** The analyses show that ease of reconfiguring classroom technology is a significant predictor of quality of conversations between faculty and students, ability to get to know students, and conveying a positive image of the school image to students. Thus, these results show that the easier it is to modify classroom technology, the easier it is for faculty to communicate and collaborate with students and the better the image of the school with students.

Recommendations

In this section we translate the research results into design recommendations. These recommendations are intended to serve as design performance guidelines, not specific design solutions.

Optimize Flexibility of Classroom Furnishings

1. **One Space, Many Uses:** Select multiple-use furnishings for use within classrooms. For example, meeting tables can serve multiple purposes; a single table can serve as a worksurface for individual tasks, and can be linked to others for small team activities. Ensure that furnishings provide sufficient worksurface area for students and faculty. Provide some height-adjustable tables designed to meet minimum ADA requirements in each classroom. For the many different learning activities that students engage in, select seating that can support a variety of non-traditional postures (not just seated

T Teacher
Students
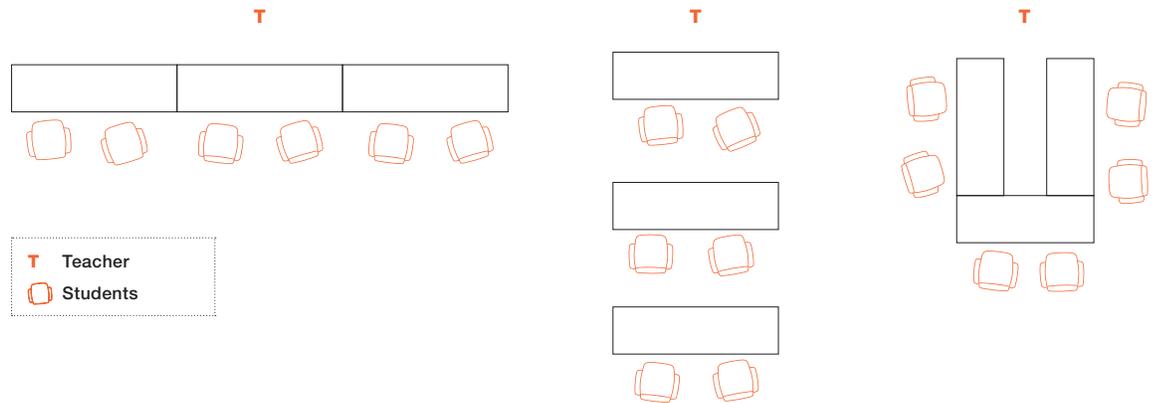
Figure 2. Select meeting tables that can be configured to suit individual and group learning activities

forward and upright) and provides flexibility to support a smooth transition between individual and collaborative activities.

Consider storage solutions that can also double as dividers of the space and can serve as movable boundaries between various types of ongoing activities within a classroom.

2. **Change Your Point of View:** The ability to easily change the focal point of interaction between students and the teacher is important to support different teaching styles—and a diversity of cultural learning norms. The classroom must be flexible enough to support many learning styles—written, verbal, and interactive.

A well-designed, flexible classroom space allows faculty optional choices for configuring specific learning experiences. Specify classroom furnishings that can be easily moved by faculty and students to create different configurations within the space (see example in Figure 2).

Optimize Flexibility of Facility and Classroom Spaces

1. **Learning Happens Everywhere:** Learning occurs in numerous and disparate places. The facility is one part of a bigger system—the campus—and thus should be designed to support informal learning and intellectual sharing as the dominant social activity.

2. **Support a Variety of Group Activities:** Create small breakout rooms or larger spaces suited to formal and informal meetings, with the right furnishings and technology for the teaching and learning work at hand.

3. **"Always On" Learning Culture:** The facility should be designed to facilitate learning, not just during regularly scheduled class hours, but also for study groups, independent research, open lab time, and other innovative uses of the space to maximize the return on investment.
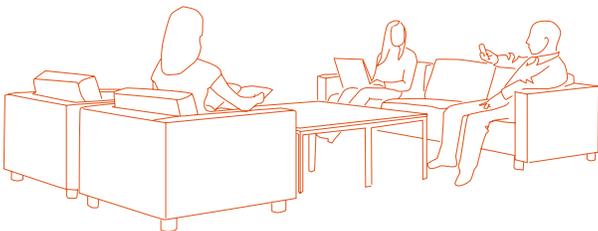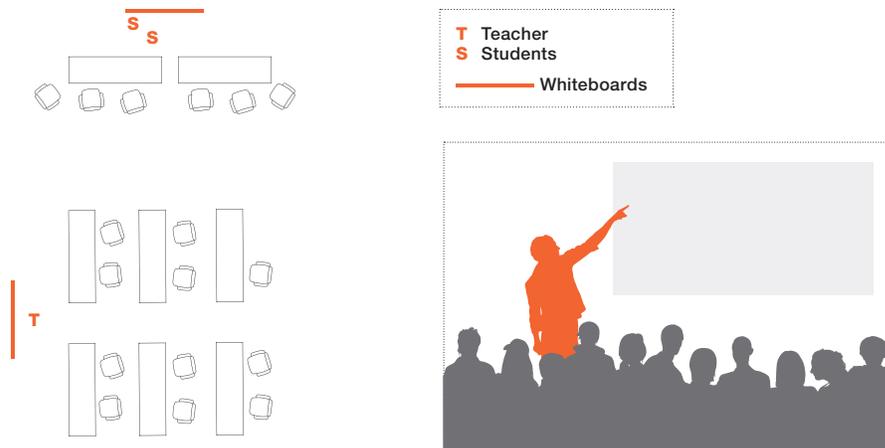
Figure 3. Place whiteboards and other display technology at various locations within the classroom

Optimize Flexibility of Technology

1. A Virtual World: The technology provided to support learning in the classroom should be easily updated, accessible for all users, and have the capability of providing immediate learning opportunities for both students in the room as well as external participants who may be remotely logged in. It should accommodate both the virtual and physical worlds.

2. Maximize Safety: Ensure that technology devices and their input devices are specified and arranged to minimize awkward postures and support flow of teaching and learning tasks.

3. Zone the Technology: Consider placing whiteboards or other display technology at several locations within the classroom to support several concurrent activities (see example in Figure 3). Ideally, vary the lighting intensity within different areas of the classroom to suit different types of concurrent individual and small team work.

Conclusions

Learning space design requirements and strategies are never "cookie cutter" across higher education organizations. However, in this case study we have been able to broadly identify several space features/capabilities that directly affect the quality of the learning experience for higher education students. Because of the research methods and analysis techniques we used, the recommendations can be applied to most higher education organizations that are attempting to provide high quality learning experience for their students.

In addition, we have found in working with many organizations that a program to regularly assess internal customer workspace needs and satisfaction can be an effective means of anticipating space use trends and optimizing the space. This type of regular assessment also brings credibility to the team responsible for managing facilities when making the case to management for change and investment.

Knoll research investigates links between workspace design and human behavior, health and performance, and the quality of the user experience. We share and apply what we learn to inform product development and help our customers shape their work environments.

To learn more about this topic or other research resources Knoll can provide, visit www.knoll.com/research/index.jsp