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Research-Informed Principles for (Re)designing Teaching and Learning Spaces

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Designing physical learning environments that connect to indicators of effective educational practice reflects a university's pedagogical commitment to student success. This article describes an approach to teaching and learning space design based on research-informed pedagogical principles successfully implemented at our university. It then articulates and provides examples of how those principles can be translated into classroom design features. These principles have had an operational and conceptual impact on campus, providing a framework for diverse audiences to think about spaces in a way that reflects shared goals, language and values.

Introduction

Traditional lecture halls are typically environments in which faculty talk and students listen, and thus these spaces do not support what is known about how students learn best. Biggs (2003) noted that this approach to teaching is so common in universities that "delivery and assessment systems the world over are based on it. Teaching rooms and media are specifically designed for one way delivery" (p. 21). Researchers studying the influence of space on the learning environment have described the integral nature of space as part of the student learning experience (e.g., Guskin, 1994; Jamieson, 2003). Because learning spaces are intended to support the teaching and learning that occur within them, it is vital that design decisions are informed by sound pedagogical principles. Research-based practices for effective teaching and learning in higher education have been proposed, but their implications for spaces have not been formally articulated to date. This article describes the development of *Principles for Designing Teaching and Learning Spaces* based on best practices in teaching. It then articulates how these *Principles* have been operationalized as classroom design features at McGill University, a large, research-intensive university in Canada.

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Context and Review of the Literature

Current Understanding of Teaching and Learning

Learning requires students to actively engage with the content and with each other. Active engagement can be encouraged in many ways, such as asking students to articulate their thinking, solve problems, as well as interact critically with content in order to analyze, synthesize and evaluate it (e.g., Driscoll, 2002; Entwistle, 2010; Pascarella & Terenzini, 2005). Through active engagement, students link new knowledge to previous knowledge, resulting in deeper and longer-lasting learning (Trigwell, Prosser & Waterhouse, 1999). Students tend to process at higher intellectual levels when collaborating than when working individually (e.g., Entwistle & Peterson, 2004; Vygotsky, 1978).

Approaches to teaching have been described along a continuum from teaching-centered to learning-centered (e.g. Kember & Kwan, 2000; Ramsden, 2003; Weimer, 2002). A teaching-centered approach is characterized by considerations of what to teach and how to "cover" the content. The instructor's role focuses on transferring knowledge to the students who receive that knowledge as it is presented. A learning-centered approach is characterized by considering what students need to learn and how to help them achieve those goals. The instructor's role focuses on

facilitating and guiding learning by encouraging discussion and providing feedback to students, the active constructors of knowledge.

Approaches to learning have been described on a continuum from a surface to a deep approach. Surface learning is characterized by memorization and reproduction of content for assignments and exams, tending to result in shorter-term knowledge retention. Deep learning, in which students search for meaning and link course content to previous experiences, tends to result in longer-term knowledge retention (e.g., Trigwell, Prosser & Waterhouse, 1999). Research suggests that there is a link between instructors' teaching approaches and students' learning approaches. When instructors use a teaching-centered approach, students tend to adopt a more surface approach to learning. Conversely, when instructors use a learning-centered approach, students tend to adopt a deeper approach to learning (e.g., Biggs, 2003; Entwistle, 2000; Ramsden, 2003; Trigwell, Prosser & Waterhouse, 1999).

Principles for Best Practice in Higher Education

Best practice principles connected to student success in higher education emphasize the importance of active learning, collaborative engagement, and student-faculty interaction for effective teaching and learning. Internationally, among the most well-known best practice principles are the *Seven Principles for Good Practice in Undergraduate Education* (Chickering & Gamson, 1987). These principles emphasize the importance of active and collaborative learning, student-faculty interaction, and prompt feedback. These principles have informed scholars worldwide, including North America (Bonwell & Eison, 1991; Ewell & Jones, 1996; McKeachie & Svinicki, 2011), Australia (Herrington, Reeves & Oliver, 2005; Miliszewska & Horwood, 2004) and Hong Kong (Joughin, 2004). Student engagement "is generally considered to be among the better predictors of learning and personal development" (Carini, Kuh & Klein, 2006, p. 2), and has been used as a proxy indicator for student learning.

The National Survey of Student Engagement (NSSE), a North American survey taken by first- and fourth-year student respondents (NSSE, 2010) has been used to measure student engagement at over 1,600 universities since 2000 (Carini, Kuh & Klein, 2006; NSSE, 2015). Based on extensive research, the NSSE captures the essence of best practices for teaching and learning in higher education. Its questions and themes were recently revised (McCormick, Gonyea & Kinzie, 2013). While this revision is in many ways similar to the previous version, changes do include adding High-Impact Practices (Kuh, 2008) as well as modernizing and clarifying some terms. Engagement themes (in italics below) have been linked to engagement indicators, permitting a more thorough interpretation of each theme. NSSE is now framed by a set of five themes (Center for Postsecondary Research, Indiana University School of Education, 2015) linked to university-level success:

A. *Academic Challenge* (formerly Level of Academic Challenge): indicators include expectations of higher-order learning, reflective and integrative learning, learning strategies, and quantitative reasoning;

B. *Learning with Peers* (formerly Active and Collaborative Learning): indicators include experiences with collaborative learning and discussions with diverse others;

C. *Experiences with Faculty* (formerly Student-Faculty Interaction): indicators include student-faculty interaction and effective teaching practices;

D. *Campus Environment* (formerly Supportive Campus Environment): indicators include the quality of interactions and supportive environment; and

E. *High-Impact Practices* (formerly Enriched Educational Experiences): these practices capitalize upon the four categories above, often going beyond the traditional boundaries of a course experience. They include learning communities, internships, study abroad, capstone courses, and other offerings (McCormick, Gonyea & Kinzie, 2013).

Over the past decade, there have been two major categories of studies looking at outcomes and engagement, investigating the link either between (1) engagement and learning, or between (2) engagement and success. As an example of the first category, the Wabash National Study of Liberal Arts Education examined six liberal education outcomes ("critical thinking, moral reasoning, leadership towards social justice, well-being, interest in and engagement with diversity, and interest in deep intellectual work") across multiple institutions and how they interacted with the NSSE themes (Blaich & Wise, 2011, p. 7). Positive associations were demonstrated between all the outcomes and the NSSE themes. The authors conclude that the NSSE themes are useful in connecting to educational outcomes in higher education (Pascarella, Seifert, & Blaich, 2010).

As an example of the second category, other researchers have focused on the relationship between student engagement and success in higher education. Kuh et al. (2008) demonstrated that engagement had the strongest impact on first-year student success. They found positive correlations between students' GPAs and their educationally purposeful activities – "practices shown to be related to desired educational outcomes" (Kinzie, 2012, p. 1) – especially for those students least prepared for college. These connections have also been demonstrated at the community college level in three large-scale studies (McClenney & Marti, 2006). They confirmed that student engagement was a strong predictor of academic success (GPA and credit completion level) as well as retention at the

community college level. Kuh (2008) notes, "engagement increases the odds that any student – educational and social background notwithstanding – will attain his or her educational and personal objectives" (p. 32). Having considered student learning and principles for best practice in higher education, we next synthesize learning space design principles, and address the link between classroom space and teaching and learning.

Principles for Learning Space Design

Numerous principles have been elaborated upon, specifically for learning space design. For example, Strange and Banning (2001) consider the qualities of effective interactions between academic environments and the individuals who inhabit them. They consider principles for learning space design in terms of the physical environment and its context, including accompanying social constructs. By considering the physical aspects of human environments and recognizing campus environments as reflecting inhabitants' collective characteristics, they explore the various components that may impact individuals' interactions within a given space.

Keppell, Souter and Riddle (2011) also suggest principles for learning space design: comfort, aesthetics, flow, equity, blending, affordances, and repurposing. These principles consider the affective aspects of an individual's experience within a space, from the learning environment's impact on physical and mental well-being to different cultural and physical space needs. The learning environment's affordances, including on-site and virtual technological/pedagogical resources, should also be considered.

Jamieson et al. (2000) propose guiding principles for developing learning spaces consistent with student-centered learning: spaces should be designed for multiple [curricular] uses, maximizing their flexibility and considering how formerly discrete university functions and services may be integrated. Vertical dimensions should be capitalized upon. Classroom features and functionality should afford maximum control to teacher and student users. Finally, students should feel ownership of learning spaces, with expanded access and use (pp. 6-8).

The NSSE themes (prior to 2013, referred to as "Benchmarks of Effective Educational Practice") provided a useful framework for teaching and learning space design at our university for three reasons. They align with our commitment to student life and learning, they are used as a tool to promote discourse in our context, and each theme could be translated into physical classroom elements**.** The educational values represented in the NSSE themes are aligned with McGill University's commitment to student life and learning. Our university has been described as a "research-intensive, student-centred university, with a commitment to excellence judged against the highest international standards, and with an enduring sense of public purpose" (Masi, 2013, p. 4). This vision of a rigorous, student-centered university is consistent with NSSE's emphasis on multiple aspects of student learning, from challenging and collaborative learning experiences to a supportive campus environment.

Before our study the NSSE themes were already being used in discussions of teaching and learning. Our institution's NSSE survey results are considered to be internal indicators of success and a useful comparator with peer institutions. While we scored well on some themes, other areas needed improvement. As a familiar and respected tool, the NSSE themes provided a useful vehicle for discussing teaching and learning environments with diverse audiences including instructors, students, senior administrators, planners, architects, and project managers.

Finally, it appeared possible that the NSSE themes could be operationalized as design features in teaching and learning environments in a way that was consistent with pedagogical research. The theoretical and conceptual rigor of NSSE was critical in establishing the credibility of these design principles. A research-informed focus on designing classrooms allows a better connection with the academic community that will ultimately use them.

The following guiding principles were developed to explicitly link the features of exemplary learning environments to the NSSE themes.

1. *Academic challenge*: Learning spaces should support students' active engagement with content and include technologies that support multiple modes of teaching and learning.
2. *Learning with peers*: Learning spaces should permit students to work both individually and collaboratively.
3. *Experiences with faculty*: Learning spaces should facilitate communication and interaction between students and faculty.
4. *Campus environment*: Learning spaces should be consistent with the university's culture and priorities as reflected in the campus master plan, follow university design standards, and be designed for future flexibility.
5. *High-Impact Practices (HIPs):* Learning spaces should be usable for a variety of learning approaches, including high-impact practices inside and outside the classroom. There should be coherence and continuity across both formal and informal learning spaces.

Table 1 maps the *Principles for Designing Teaching and Learning Spaces* onto room features to reflect the recent revisions to the NSSE themes. Each principle is connected to student learning, and examples of its translation into specific design features are included. The *Principles* are aspirational

	Principle	Layout	Furniture	Technologies	Acoustics	Lighting/colour
Academic challenge: Promote individual, active engagement with content	Learning spaces should allow students to actively engage with content and include a range of technologies that support multiple modes of teaching and learning.	☐ Work surfaces for notebooks, laptops, textbooks	☐ Comfortable furniture; ☐ Varied furniture to support different types of tasks and preferences	☐ Access to infrastructure (e.g., printing, power for student laptops) ☐ Access to resources (e.g., LMS, internet, virtual labs, specialized software) ☐ Multiple sources and screens for simultaneous display of different learning materials	☐ Acoustic design to avoid distraction from outside and inside sources	☐ Appropriate lighting for individual work ☐ Intentional use of colour to promote focus
Learning with peers: Promote active engagement with one another	Learning spaces should provide features that permit students to work both individually and in collaboration with one another.	☐ Promote face-to-face communication (e.g., two rows of students on a tier, small groups) ☐ Individuals can move about easily ☐ Unobstructed sightlines	☐ Flexible seating (e.g., fixed chairs that rotate, movable tables and chairs, tablet chairs on wheels) ☐ Intentional use of furniture of different heights and shapes	☐ Shared workspaces (e.g., writable walls, digital workspace)	☐ Sound zones support multiple simultaneous conversations ☐ Appropriate amplification available (e.g., student table microphones)	☐ Different lighting patterns to support different activities ☐ Using colour to define groups' use of space
Experiences with faculty: Promote interaction and communication	Learning spaces should facilitate communication and interaction between students and faculty.	☐ Easy access to all students (e.g., multiple aisles, unobstructed sightlines)	☐ Podium doesn't interfere with sightlines, movement and interaction, while being large enough for instructional materials. ☐ Flexible furniture to support different teaching strategies (e.g., movable, variable heights)	☐ Screen sharing ☐ Ability to control classroom technologies away from the podium (e.g., remote mouse, wireless projection)	☐ Sound zones support multiple simultaneous conversations ☐ Appropriate amplification available (e.g., wireless audio amplification)	☐ Different lighting patterns to support multiple types of teaching tasks ☐ Colours distinguish purposes (e.g., where chairs go, what groups work on what surfaces/with whom)
Campus environment: Promoting high-quality learning spaces across campus	Learning spaces should be consistent with the university's culture and priorities as reflected in the campus master plan, follow university design standards, and be designed with future flexibility in mind.	This category relates to the campus environment as a whole. It provides opportunities for supporting students' learning through consistently high-quality learning spaces through the application of standards and design principles. For example: ☐ University standards applied, e.g., classroom and IT standards; accessibility guidelines; recognized sustainability practices, materials and technologies; regulated building operations (e.g., temperature and ventilation). For further details and/ context, see McGill University Classroom Guidelines and Standards ☐ Design classrooms for flexible future use where possible (e.g., raised floors for conduits to permit future classroom reconfiguration). ☐ Design classrooms, consistent with the principles of Universal Design and Universal Design for Learning, to meet the needs of and be used by all populations using these spaces (e.g., natural light, sufficient storage, standardized room controls to facilitate use of multiple classrooms). ☐ Design classrooms to integrate with surrounding space (informal spaces, etc.) ☐ All classrooms are thought of within the campus master plan.			
High-Impact Practices (HIPs)	Learning spaces exist within a larger campus context; there should be an ease of transition between spaces so as to better support high-impact practices inside and outside the classroom.	Multiple types of campus physical environments are needed to support a variety of HIPs. Ensure availability of, and support for, a diverse range of affordances (both physical and virtual) to maximize HIPs for student learning.				

Table 1. ***Principles for designing teaching and learning spaces. Revised from Weston, Finkelstein, Ferris and Abrami (2010).***

in nature; existing constraints (budget, scheduling, building limitations, architectural heritage, faculty culture, etc.) may limit the actual design decisions.

Impact of the *Principles*

We consider the impact of the *Principles* in operational and conceptual terms. The discussion of operational impact provides examples of how the *Principles* have been effective in making the NSSE themes concrete. Conceptual impact is defined as how the *Principles* provide a framework for thinking about teaching and learning spaces that reflects shared goals, language, and values. In recent years, these have been demonstrated at various levels within the university community.

The *Principles* were developed in the context of a university-wide initiative to improve classrooms. While our focus is on the impact of the *Principles* themselves, it is important to consider them in the context of a process coherent with their underlying values and philosophy (see McGill University's Teaching and Learning Spaces Working Group, 2014, for process).

Operational Impact

In order to illustrate how the *Principles* have been implemented we provide three brief examples, followed by illustrative before and after photographs. We have chosen a range of classrooms renovated between 2009 and 2012: a tiered lecture hall (178 students), a flexible flat classroom (65 students), and an Active Learning Classroom (72 students). The careful designs of these classrooms demonstrate ways in which the *Principles* can be applied across diverse physical environments. Elaborated descriptions of these three classrooms are presented in the Appendix, including the vision for each room, its key features (including technologies and innovative aspects), staffing support, and links to related materials.

	Tiered lecture hall [See Appendix]	**Flexible flat classroom** [See Appendix]	**Active Learning Classroom** (ALC) [See Appendix]
Summary	A high-use, high-capacity lecture hall has been updated.	A previously lecture-focused space with fixed seating now supports a greater variety of teaching and learning experiences.	A previously traditional flat classroom has been redesigned to engage students actively and collaboratively in their learning.
Academic challenge	Work surfaces doubled in size; appropriate lighting supports different tasks	Ample workspace; both natural and improved indirect lighting	Ample work surfaces; comfortable furniture; a range of technologies; appropriate acoustic treatments and lighting options
Learning with peers	Armless chairs permit side-by-side collaboration; sound zones ensure that students and instructors can all hear and be heard	The change from fixed tables and swing-out chairs to lightweight, sturdy wheeled tables and chairs permits flexibility: students can collaborate in pairs or small groups and use whiteboards	Round tables for collaboration; shared digital and physical workspaces (screen-sharing and writable walls)
Student interaction with faculty	Unobstructed sightlines; gradual slope	Flexible furniture permits easy circulation; clear sightlines and flat design decrease the instructor-student distance and reduce the traditional hierarchy of front-facing rooms	Central podium; instructors can circulate freely; sound zones and amplification allow students and instructors to hear and be heard in plenary and small group discussions
Campus environment	Upgraded ventilation; better lighting; use of activating colors	Improved lighting; ease of movement and comfort in the space; storage	Improved ventilation; natural and artificial light (adjusts for daylight); sustainable building practices, including a raised floor for future reconfiguration
High-Impact Practices	Classroom affordances help instructors implement High-Impact Practices for student learning.		

Table 2. Examples

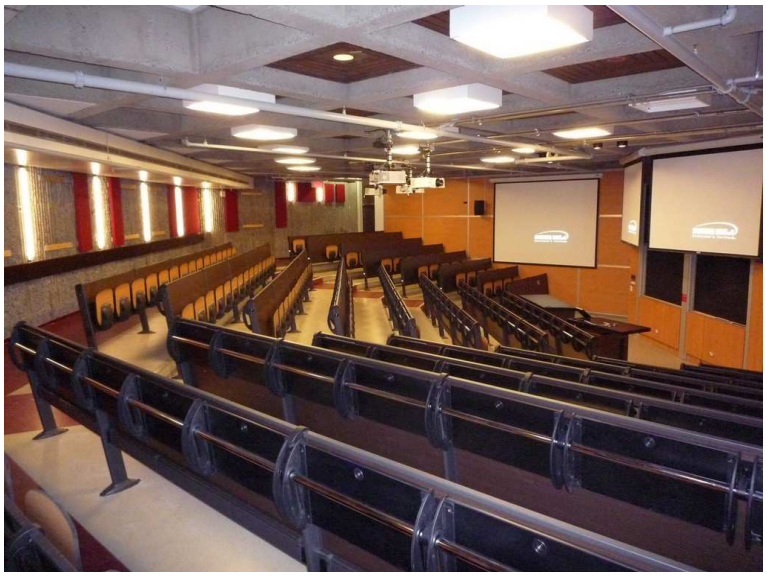

Illustration 1. Tiered lecture hall [Leacock 219] - after

Illustration 2. Tiered lecture hall [Leacock 219] - before

Illustration 3. Tiered lecture hall [Leacock 219] - before

Illustration 4. Flexible classroom [McConnell 12] - after

Illustration 5. Flexible classroom [McConnell 12] - before

Illustration 6. Active Learning Classroom [Education 627] - after

Illustration 7. Active Learning Classroom [Education 627] - before

Conceptual Impact

While the before and after photographs clearly show the effect of the *Principles* on these classrooms, we propose that the *Principles* had an impact beyond these renovated classrooms. The *Principles* provide a conceptual framework for shared goals, language and values related to teaching and learning spaces.

On our campus, there has been widespread acceptance of the *Principles* as reflecting stakeholders' goals and as a tool to help guide decision-making. They frame conversations about teaching and learning spaces that are grounded in pedagogical research, rather than only aesthetics or enrollment statistics. There has been a shift in the language used by institutional project managers and architects as they have moved from being unfamiliar with or resistant to the *Principles*, to understanding their value, to ultimately advocating for their use. Over time, our internal architects have begun to educate others in their field about the *Principles'* relevance and importance. The *Principles* have helped foster better working relationships and communication between the academic and operational sides of the university, and ultimately have resulted in discourse changes privileging active and collaborative learning and student-faculty interaction.

Senior administrators have begun using the language of the *Principles* in strategic documents (e.g., the Provost's

Strategic Academic Plan, Masi, 2012, p. 35). Seeing learning environments as an integral part of the Strategic Academic Plan is powerful evidence that space is now a factor in the university's conception of teaching and learning. Similar evidence of the valuing of teaching and learning spaces is found in the Principal's Priorities: one long-term priority is "improving the University's classrooms and teaching labs by undertaking major renovations and equipment renewal and including 'active,' collaborative and innovative teaching environments" (Fortier, 2014, p. 1). This is the first time that teaching and learning spaces have been given this level of visibility in our university context.

Conclusion

A university's physical campus environment should be linked to its aspirational identity statement and the pedagogical commitment therein (Joint Information Systems Committee, 2006; Long & Holeton, 2009). Since space can be seen as "authorising and enabling certain behaviors over others" (Jamieson, 2003, p. 122), learning spaces need to be designed to foster and support behaviors that promote student learning. Such designs should be part of strategic directions for teaching and learning at the institutional level.

In our experience, the *Principles for Designing Teaching and Learning Spaces* described are unique in that they are based on a theoretically and conceptually rigorous tool. The NSSE themes provided a compelling framework for guiding our university towards a vision of teaching and learning spaces. The *Principles* have had a powerful impact at our campus, both operationally and conceptually. We encourage colleagues at other institutions to develop or adapt research-based principles suitable to their contexts, to ensure that teaching and learning space renovations focus on what is most important: the teaching and learning that occur within them.

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Appendix

Example Classroom #1: Tiered Lecture Hall

Name: Leacock 219, McGill University

Website: http://www.mcgill.ca/tls/spaces/classrooms/leacock-219.

Details: The space was renovated in 2010. The classroom is 1957 square feet with a capacity of 178 students.

Design: Thibodeau Architecture & Design, www.gotad.ca; McGill Design Services, http://www.mcgill.ca/facilities/design

Vision: Leacock room 219 is an updated high-use, high-capacity lecture hall in one of our University's main buildings. Despite existing fixed concrete tiers (with one row on a tier), the renovations incorporated design features that permit active and collaborative learning, based on principles of physical space design that can support or foster engaging teaching and learning experiences.

Key Features: This 2010 renovation updated a high-use, high-capacity (178 seats) lecture hall in one of our university's main buildings. Through this renovation, academic challenge is supported by designing student work surfaces that more than doubled in size (allowing for the use of a laptop and notebook) and providing appropriate lighting to support multiple tasks. Learning with peers is fostered by seating without armrests, enabling students to turn and discuss class activities with those nearby. Also, sound zones that ensure that not only are students able to hear the instructor, but the instructor is able to hear the students and the students are able to hear each other. Student interaction with faculty is fostered by unobstructed sight-lines and the gradual slope of the lecture hall. The campus environment was improved through upgrades to ventilation, better lighting, and use of activating colors (such as the red floor and acoustic paneling). The room's affordances help make it easier for instructors to implement High-Impact Practices for student learning within and beyond this classroom.

Technologies: Dual-source projection and multiple classroom technology sources (computer, document camera, VCR, etc.) and multiple screens permit simultaneous display of different learning materials; multiple screens ensure that all students are able to see projected materials clearly. Special equipment was integrated into the podium including a full-size piano keyboard (used by a number of music courses in this room). Wi-Fi is available across campus and students also have access to the university's learning management system (LMS).

Staffing: Centrally scheduled; centrally supported. Consultations are available to instructors teaching in all campus classrooms.

Innovative features or uses: This renovation has involved the intentional incorporation of physical design elements that permit active and collaborative learning even within "traditional" spaces such as lecture halls. These include seating that permits collaborative small-group activities such as think-pair-shares, acoustics that enable students to hear one another well, as well as clear sight-lines between students and from students to the instructor.

Research/Recognition/Press:

Finkelstein, A., & Winer, L. (September 2014). Active learning anywhere: Designing all spaces to support active learning across campus. Presented at EDUCAUSE 2014. http://www.educause.edu/annual-conference/2014/seminar-18p-active-learning-anywheredesigning-all-spaces-support-active-learning-across-campus-separat

Example Classroom #2: Flexible Flat Classroom

Name: McConnell 12, McGill University.

Website: http://www.mcgill.ca/tls/spaces/classrooms/mcconnell-12

Details: The space was renovated in 2012. The classroom is 1236 square feet and can seat up to 65 students.

Design: McGill Design Services, http://www.mcgill.ca/facilities/design

Vision: McConnell 12 was previously a fixed seating, lecture-focused space that was transformed to support a greater variety of teaching and learning experiences. Adjustable, lightweight, sturdy furniture is easy to re-position, facilitating transitions between various teaching and learning approaches such as small group collaboration, working in pairs, lecture, etc. Multiple writable walls encourage collaboration.

Key Features: This 2012 renovation allowed a previously front facing, fixed seating, lecture-focused space to expand its utility to support a variety of teaching and learning experiences. Changing from fixed tables and swing-out chairs to lightweight, sturdy wheeled tables and chairs permits flexibility. Learning with peers can occur in pairs or small groups who can collaborate at tables and use one of the several whiteboards throughout the room. Meanwhile, academic challenge is supported by ample workspace and both natural and improved indirect lighting. Student interaction with faculty is fostered by multiple aisles (and flexibility to create different furniture configurations) such that the instructor can easily circulate throughout the classroom. Clear sight-lines and the flat classroom design further diminish the distance between the instructor and the students as well as reduce the implied hierarchy implicit in a traditional front-facing fixed room. The campus environment was enhanced with improved lighting, ease of movement and comfort in the space, and a practical feature such as wall hooks for students' outerwear.

Technologies: Projection from a laptop is available; the simplified push-button technology at the instructor podium is accessible and intuitive. Students can use multiple whiteboards around the room to collaboratively brainstorm and share ideas. Furthermore, they have access to wall-mounted power outlets for their laptops. Wi-Fi is available across campus and students also have access to the university's learning management system (LMS).

Staffing: Centrally scheduled; centrally supported. Consultations are available to instructors teaching in all campus classrooms.

Innovative features or uses: The very nature of this reconfigurable, flat classroom lends itself to a variety of teaching and learning approaches while still maintaining a reasonably high capacity. Students have access to multiple whiteboards around the room to collaboratively brainstorm and share ideas, encouraging multisensory group work. Complementary colors, along with access to natural light, subtly brighten up the classroom. A practical feature such as wall hooks help keep the classroom tidy by storing bulky winter outerwear out of the way.

Research/Recognition/Press:

Finkelstein, A., & Winer, L. (September 2014). Active learning anywhere: Designing all spaces to support active learning across campus. Presented at EDUCAUSE 2014. http://www.educause.edu/annual-conference/2014/seminar-18p-active-learning-anywheredesigning-all-spaces-support-active-learning-across-campus-separat

Example Classroom #3: Active Learning Classroom (ALC)

Name: Education 627, McGill University.

Website: http://www.mcgill.ca/tls/spaces/classrooms/education-627.

Details: Renovated in 2009, 1344 square feet, 72 student capacity.

Design: McGill Design Services, http://www.mcgill.ca/facilities/design

Vision: Active Learning Classrooms (ALCs) are designed to foster teaching and learning in an atmosphere conducive to engaging students actively and collaboratively in their learning. Research points to increased student satisfaction and academic performance in such spaces (e.g., Beichner et al., 1999; Dori & Belcher, 2005; Whiteside, Brooks & Walker, 2010).

Key Features: This 72-seat classroom was the first Active Learning Classroom (ALC) designed at our university in 2009. ALCs are learning environments specifically designed to foster teaching and learning in an atmosphere conducive to engaging students actively and collaboratively in their own learning.

The principle of an environment that supports academic challenge is carried out through such features as ample work surfaces, comfortable furniture, a range of technologies, as well as appropriate acoustic treatments and lighting options. The classroom's affordances that support learning with peers include round tables for collaboration and shared digital and physical workspaces (screen-sharing and writable wall space). Student interaction with faculty is fostered by the central location of the podium and the ease with which instructors can circulate from table to table, and the creation of sound zones and amplification such that both students and instructors can be heard throughout the room when needed. Additionally, small group discussions can occur without unreasonable noise levels resulting. The campus environment has benefitted due to improvements to ventilation, the combination of natural light and artificial light that adjusts for daylight, and attention to sustainable building practices, including a raised floor for ease of wiring and future reconfiguration.

Technologies: Dual-source projection and multiple classroom technology sources (Sympodium, document camera, student computers, etc.) and multiple screens permit simultaneous display of multiple learning materials. Instructors can control classroom technologies away from the podium via a wireless mouse. Shared student workspaces are both analog (writable walls) and virtual (hard-wired screen-sharing from laptops or desktop computers). There are outlets for student laptops, networked printing, and multiple desktop computers are available at each student table. Finally, students have access to resources such as the university's learning management system (LMS) and wired or wireless internet (via their laptops or available desktops). A raised floor allows for reconfiguration of the technology at each student table without re-drilling.

Staffing: Centrally scheduled; centrally supported. Student technology assistants can be available on-site during the first few weeks of class. Workshops, consultations and information sessions are available to instructors interested in teaching in this classroom.

Innovative features or uses: The centralized podium, writable walls and multi-source, multi-screen projection mean there is no "front of the room". This promotes interaction and engagement between students and instructors in the space. The digital screen sharing can move any student screen to any of the main projectors in the room. The student screen can be from any device that can connect to a projector; no software is required. Tables are also colored to visually identify teams as well as provide immediate recognition of the writable wall space dedicated to that team (i.e., the yellow table can collaborate on yellow glass).

Research/Recognition/Press:

Documentary videos: Teaching and Learning Services, McGill University (2011). Teaching and learning experiences in Active Learning Classrooms at McGill: Highlights: http://www.mcgill.ca/tls/spaces/alc/videos

Finkelstein, A., Tovar, M., Ferris, J., & Weston, C. (October 2010). Designing and supporting Active Learning Classrooms. Presented at EDUCAUSE 2010, Anaheim, California. http://www.educause.edu/annual-conference/2010/seminar-14a-designing-and-supporting-active-learning-classrooms.

Finkelstein, A., Weston, C., & Ferris, J. (January 2013). Teaching and learning experiences in Active Learning Classrooms. Presented at the 2013 International Higher Education Teaching and Learning (HETL) Conference, Orlando, Florida.

Weston, C., Ferris, J., & Finkelstein, A. (October 2012). Architecture as pedagogy: Principles and process for learning space development. Presented at the annual conference of the Professional and Organizational Development (POD) Network, Seattle, Washington.