

E-business Technologies Conference

CLASSROOM LAYOUTS FOR TECHNOLOGY- BASED ACTIVE LEARNING SPACES

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Active learning spaces, classroom layout, educational
technology

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THE PROJECT

PBL Classroomsfor the 21st Century.



Fig 1. Washington State University's Spark G45 rounded room.
Main view from the floor.



01 Active learning spaces,

02 Classroom layout

03 Educational technology



ACTIVE LEARNING SPACES

Active learning has its merits, mainly in keeping students engaged in their learning work and complementing their technical competencies with transferable skills. By the end of the learning path, students are better equipped and ready for jobs.

ACTIVE LEARNING SPACES



- active learning involves “students in doing things and thinking about the things they are doing”;
- students are involved in more than passive listening;
- students are engaged in activities (e.g., reading, discussing, writing);
- there is less emphasis placed on information transmission and greater emphasis placed on developing student skills;
- student motivation is increased (especially for adult learners).

SCALE-UP

Student-Centered Active Learning Environment with Upside-Down Pedagogies



Fig. 3. SCALE-UP room at the North Carolina State University; 99 seats.

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- Improve student interaction while they work on assignments;
- The lecturer freely observes, asks questions, and clarifies misgivings while circulating through the classroom;
- Students are allocated by three- element groups at round tables (180 cm diameter) with nine seats to discuss their work;
- Whiteboards are arranged so the group can draw schemes and align their thinking;
- Each group has one laptop computer to search on the internet and projectors.

TEAL

Technology-Enabled Active Learning



Fig. 4. An example of a TEAL room at MIT, including the nine-seat tables, 360° whiteboards and video projectors; the desktop experiments are visible in the foreground.

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- Policentrically designed rooms with round tables for student work (13 tables);
- Provides a “media-rich environment,” including videos with 2D and 3D visualizations, desktop experiences, web-based home assignments, and conceptual questions using PRS, personal response system.

PAIR-UP

Pedagogy-rich; Assess learning impact; Integrate innovations;
Revisit emerging technologies



Fig. 5. PAIR-up room at the University of Minnesota.

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- The first two rooms had 45 for Electrical Engineering/Computer Science and 117 seats for Biological Sciences;
- The tables have nine seats for three student groups teamwork (These are laptop-based rooms, and there are 360° glass marker boards.).

The PAIR-up rooms have two main girders:

- space flexibility, i.e. the room should transform into different configurations;
- student-centered teaching because the ultimate objective is to improve students' learning

TILE

Transform, Interact, Learn, Engage



Fig. 6. Detail of a table in a TILE room, remarking one laptop per group of three students.

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- Is composed by the nine-seat tables, power sockets and network access;
- Each table has three laptops;
- The walls have multiple whiteboards which cover 360°;
- Each table has three networked laptops and its own dedicated wall-mounted monitor that can display data from a laptop on the table, the instructor's screen, or work from other laptops around the room;
- The instructor's station is in the centre of the room.

Teaching in the Round

by David Harlan | Washington State University's Spark G45 rounded room



Fig 7. Washington State University's Spark G45 rounded room. Main view from the floor.

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- **Motion:** the arena should be divided into quarters; the quarters help the presenter organize their moving. The solution is movement;
- **Positioning and lighting:** keep in the circle and avoid walking in the aisles because the lighting is designed to focus inside the circle;
- **Eyes focus:** do not focus on the front only; extend attention to other senses besides vision; hearing is 360° and may help to understand if the audience behind is engaged or not (the presenter may feel that someone is drifting away);
- **Interactions:** during questions and answers with the audience, approach the person who posed the questions, and then move away in the opposite direction in the circle repeating the question.

	Layout	Furniture	Technologies	Acoustics	Lighting/Color
Academic challenge: promote individual, active engagement with content	Work surfaces for notebooks, laptops, and 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	Acoustic design to avoid distraction from outside and inside sources.	Appropriate lighting for individual work. Intentional use of colour to promote focus

MCGILL’S “PRINCIPLES FOR DESIGNING TEACHING AND LEARNING SPACES”

	Layout	Furniture	Technologies	Acoustics	Lighting/Color
Learning with peers: promote active engagement 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.

MCGILL’S “PRINCIPLES FOR DESIGNING TEACHING AND LEARNING SPACES”

	Layout	Furniture	Technologies	Acoustics	Lighting/Color
Experiences with faculty: promote interaction and communication	The podium does not 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).	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	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 different activities. Using colour to define groups' use of space.

MCGILL’S “PRINCIPLES FOR DESIGNING TEACHING AND LEARNING SPACES”

CONCLUSIONS

Active learning classrooms, designed to promote collaboration and engagement between students, are more effective at improving student learning than traditional classrooms

Flexible furniture configurations, such as group tables and swivel chairs, have been found to promote higher levels of student engagement, collaboration and participation compared to traditional configurations

It is important to consider pedagogical strategies and instructional design principles when designing active learning spaces

The detailed analysis of these projects, proof-of-concept, and examples permits the identification of good practices on acoustics, lighting, and suitable technology to support students' work and learning.

For future improvement, maybe bring the idea of the central arena in the round room to the active learning spaces, increasing their flexibility and allowing more performative lectures.

*"The learning process continues
until the day you die."*

Kirk Douglas

THANK YOU FOR
YOUR ATTENTION!

ANY QUESTIONS?

Classroom Layouts for Technology-based
Active Learning Spaces

