CLASSROOM DESIGN GUIDELINES AND STANDARDS

Re-Visioning Classroom Design at Algonquin

Version 2.0

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Classroom Design Guidelines and Standards

RE-VISIONING CLASSROOM DESIGN AT ALGONQUIN

INTRODUCTION

Algonquin College's BYOD (Bring Your Own Device) initiative, which started in 2012, created layout and technical standards that prioritized enabling students to plug in their laptops for power and internet access. Since then, campus renovations have created modern informal learning spaces that support both technology use and collaborative learning. It is evident that revisiting our classroom standards, to support a gradual evolution of our formal learning spaces, is an important next step.

ABOUT THIS DOCUMENT

Purpose of this Document

1. Summarize the evolution of classroom design at Algonquin.
2. Review existing classroom design principles and standards.
3. Highlight recent classroom design activity related to active learning and multi-modal delivery.
4. Confirm a new set of classroom standards.
5. Establish a process for the periodic review of classroom standards.

Intended Audience

1. **College space planning and development groups:** Integrated College Development Planning Group (ICDP), College Space Committee (CSC)

2. **Internal departments and groups**
   - Academic Development/Learning and Teaching Services
   - Facilities Management
   - Information Technology Services
   - Registrar's Office
   - Student Support Services/Centre for Accessible Learning
   - Faculty

Scope

These guidelines and standards focus on *open classrooms only* rather than dedicated learning spaces such as labs, workshops, studios etc.

Related Algonquin College Documents

Design Guidelines Document (May, 2004)
Students with Disabilities (AC01)
Learning Spaces at Algonquin College

EVOLUTION OF CLASSROOM DESIGN AT ALGONQUIN

Mobile – Bring Your Own Device (BYOD)

In 2012, BYOD programs were introduced in which students were expected to buy laptops for in-class use. The BYOD initiative dramatically changed learning spaces at Algonquin through:

- adoption of "laptop" classroom type that provided power and data to every student table
- establishment of a standard "eclassroom" technology set-up with a teacher desktop computer with monitor, projector and pull-down screen, speaker system, and control system for displaying computer content and playing audio/visual media in the classroom.
- elimination of open access computer labs and incremental conversion of classrooms into laptop/mobile

As wireless connectivity across campuses improved over time, a "mobile" classroom design standard emerged that removed the wired data connections and supported fewer direct power connections.

Mobile classrooms are currently Algonquin College's classroom design standard. They include a teacher station at the front of the room and rows of fixed student desks leading towards the back.

In terms of learning experience, the layout in mobile classrooms reflect a traditional instructor-centred teaching approach. This is because providing power and internet connectivity to student desks required fixed rows of desks along room periphery. The teacher station and whiteboard are also at the front of the room.

Laptop Classroom: Fixed desks, power and data

Mobile Classroom: Fixed desks, access to power, but not data (wireless connectivity in place)
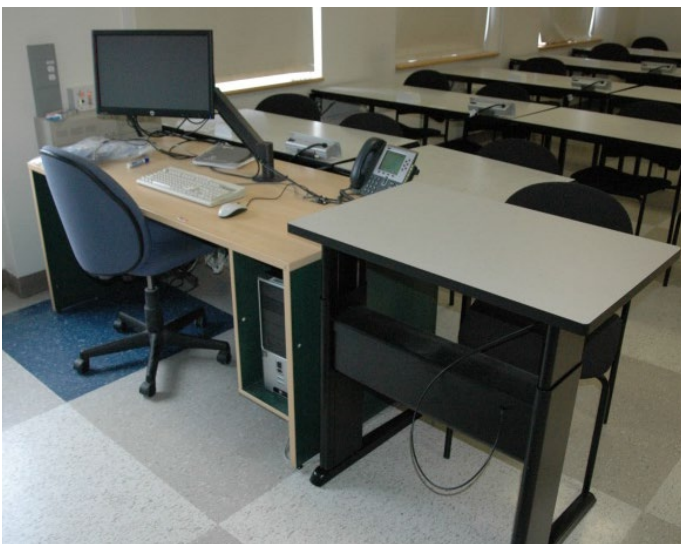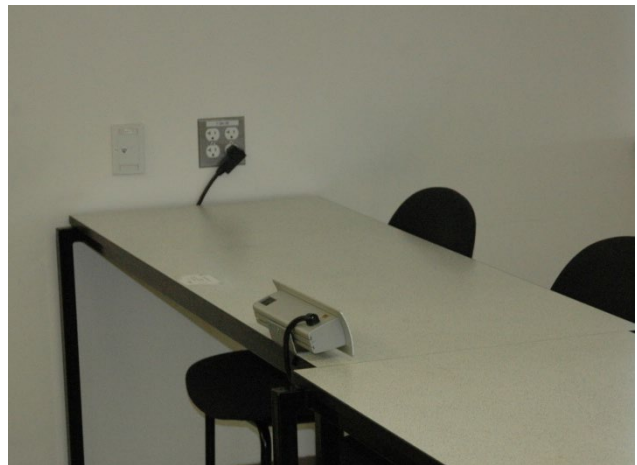
Standard teacher station. A height-adjustable desk for students.

Accessibility

Height-adjustable student desks and ergonomic chairs started to be added to many classrooms – to accommodate student needs. There are on-going challenges with the addition of this equipment.

- Faculty use the height-adjustable tables themselves
- Students and/or faculty without special needs use the ergonomic chairs
- Ergonomic chairs are removed from the rooms

The result is that students truly needing this equipment may not have access to it. An awareness raising campaign is currently underway to educate faculty and students about leaving the special furniture for its intended users.

Collaborative and Active Seating Classrooms

A few rooms in B-building were converted into **collaborative classrooms** as part of a pilot to create classroom layouts that supported student-centred, collaborative learning. Features in these classrooms include:

- moveable whiteboards on tracks
- chairs on castors
- "optionally fixed" tables situated on periphery of room to provide some access to power. The lighter desks could be moved for some added flexibility.

Collaborative Classroom - Woodroffe

The pilot also created some **active seating classrooms** with moveable whiteboards and bucket chairs on castors. There were no fixed tables.

Active Seating Classroom - Woodroffe

Prototype Active Learning Classroom

In 2019, three new classrooms were built in C building at Woodroffe campus. One classroom (C150) was built as a "prototype" active learning classroom. A partnership between Facilities Management and Learning and Teaching Services, the prototype active learning classroom was intended to support research into classroom design that supported student-centred active learning practices.

Learning and Teaching Services (LTS) recruited faculty whose teaching style included active learning. Courses with a minimum class enrolment of 45 students were selected for piloting the new prototype active learning classroom. These faculty members participated in a design charrette – led by Facilities Management and its contractors – to determine the design of the prototype classroom. LTS worked with the Registrar's Office to ensure that these recruited faculty members were scheduled into C150 for the Fall 2019 semester. Survey data from was also collected by LTS in order to understand both the faculty and student experience of the prototype active learning classroom.

The pandemic paused activity to recruit suitable faculty and courses into this room for continued research. However, the pandemic interrupted this activity.

Features of the prototype active learning classroom include:

- whiteboards on all walls (except ones with windows)
- tables and chairs on castors
- slightly narrower tables – to facilitate creating collaborative student pods
- height-adjustable teacher station
- ceiling-mounted electrical cords – to maximize the number of students who can plug in their laptop
- 5 monitors mounted around the room
- Sharelink system in which students and faculty can wirelessly display their laptop work onto the monitors

- 2 electric height-adjustable desks
- Mobile laptop podium – to allow faculty to set their laptop on and work from anywhere in the classroom

The classroom designers created various layouts that could be supported by configuring the furniture in certain ways.
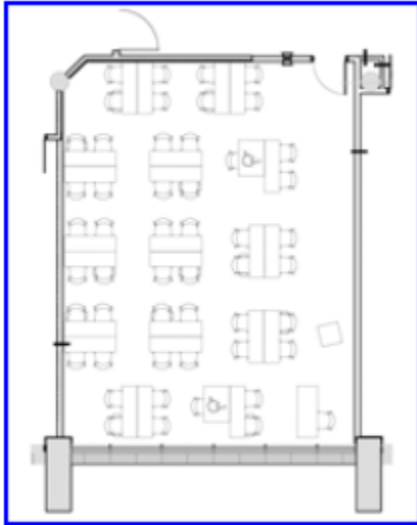
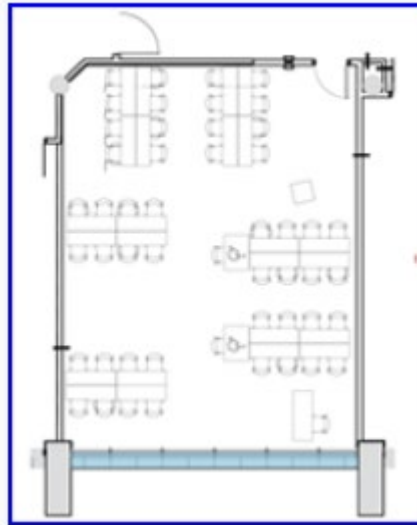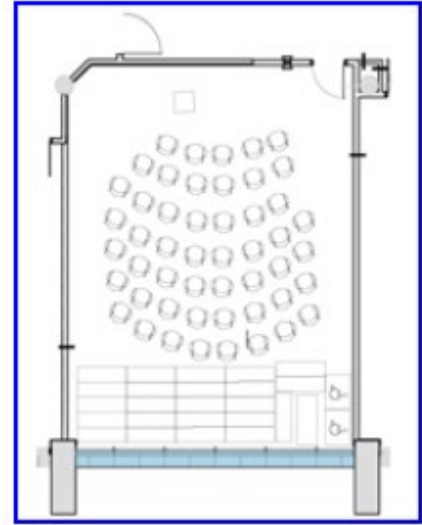
Collaborative Pods of 4   Team Groups of 8   Presenter

Pilot Research Findings

Both faculty and students appreciated how the moveable desks and chairs encouraged more interaction and group work. Some also appreciated the multiple monitors that surrounded the room. The teachers especially appreciated the ample whiteboard space. One negative finding was the ceiling mounted electrical cabling proved to be cumbersome and was considered a potential hazard by some faculty members.

Multimodal Delivery

Multimodal delivery provides student flexibility – allowing them to choose how to synchronously attend class – either on-campus or virtually via web conferencing. A multimodal implementation project was launched in Fall, 2021 in which 4 open access (common standard) classrooms were upgraded to include a new height-adjustable teacher station and new multimodal technology, on top of existing common standard classroom equipment:

Ottawa – B232 and T327
Pembroke – 329
Perth – 101c

The new multimodal equipment and furniture included:

- **Document camera on a pivoting arm** (whiteboard alternative for capturing a professor's writing during a lesson; can also turn camera to capture the in-class students)
- **Secondary touch-screen** – (whiteboard alternative for capturing a professor's writing during a lesson)
- **Microphone array** – to capture professor and in-class students
- **Confidence monitor** – to display virtual students for faculty to support their engagement

NOTE: these features are based on specifications outlined in the *Multimodal Learning Delivery Requirements: Phase I: Planned Winter 2022.*

For Winter 2022, T232 was also converted to an active learning classroom with multimodal equipment. However, this was a space request project that was approved and financed prior to launch of the multimodal implementation project. Therefore, the quality of the video cameras and the microphone array system installed was higher than that approved for the Phase I classroom upgrades associated with the multimodal project.

For Fall, 2022, 9 additional common standard classrooms were upgraded using the multimodal standards established for the classrooms built during Winter 2022:

Ottawa - CA205, A150, B110, B130, H214, J217, P201, T334
Pembroke – 213

In addition, B156 was also converted to an active learning classroom with multimodal equipment for Fall 2022. Again, this was a space request project that was approved and financed prior to launch of the multimodal implementation project. The same technology and furniture from T232 was used for this classroom.

Prototype Active Learning Classroom - C150 (Woodroffe)

An additional classroom (T232) was approved for conversion into an active learning classroom. The room was renovated based on the design specifications for C150 — except that ceiling-mounted reeled electrical cables were not added as per the feedback collected from C150.

Multimodal Classroom Technology 2.0

Feedback collected from faculty surveys, focus groups, and ITS support calls clearly showed consistent multimodal technology failures — likely due to the expedient need to install equipment onto existing infrastructure. A Multimodal Classroom 2.0 upgrade project will be completed in 2023 in order to upgrade the current multimodal technology standard in all standard multimodal classrooms (not multimodal active learning classrooms). An updated multimodal technology standard will be confirmed by Fall, 2023.

CLASSROOM DESIGN STANDARDS AT ALGONQUIN

Today's Context of Teaching and Learning

Algonquin's focus on creating learner-driven, personalized learning experiences corresponds with a teaching approach that embraces active learning. Today's college professor does not simply lecture to students but guides them through learning experiences — as individuals and as collaborative groups. Teaching is about facilitating active learning — which includes a continuum of activities from interactive lessons to complex project-based learning and group work. Thirty years of research has shown that active learning activities produce better learning outcomes than instructor-centred teaching practices focused on lecture and information transmission (Freeman et al., 2014). However, Algonquin's mobile

classroom layout, which is the current classroom design standard, is oriented towards instructor-focused, lecture-based teaching.

The pivot to remote teaching during the pandemic involved the mass delivery of courses via web conferencing. This experience brought forth new opportunities for students to choose how to participate in courses - either virtually or in-person – according to what flexibly meets their needs.

Re-Visioning Classroom Design at Algonquin

The goal of classroom design at Algonquin is to support flexible learning options and active learning practices across all types of open classrooms. This goal is supported through a common set of classroom design principles and a definition of classroom standards – applicable to open classrooms at all college campuses.

These principles and standards will help to evolve Algonquin's fleet of classrooms – which will include a few unique rooms with enhanced features. For example, enhanced-display active learning classrooms, which include multiple screens and wireless screen sharing, are special classrooms designed to for project-based and collaborative learning. Multimodal-enhanced classrooms will be equipped with standard classroom technology – plus additional equipment such as a camera, microphones, hand-writing capture, and extra monitors, to support multimodal delivery.

Classroom Design Principles: Supporting Active Learning

These classroom design principles are based on well-established qualities of active learning described in educational research literature and were informed by feedback collected from Algonquin faculty and students. They were developed by Learning and Teaching Services in 2019, with input from faculty, students, and the College Space Committee. A condensed version of the design principles is provided in Appendix 1.

Social - Supports a Community of Learners

Flexible classroom design that allow physical movement "erases the line" between instructors and students; this encourages interaction and increases learner engagement (Rands, 2017).

- Enables professors to be facilitators of learning – not just transmitters of information (e.g. are not stuck as presenters at front of the room).
- Allows students to discuss and work as groups.
- Supports brainstorming, note-taking, and visualizing of individual/group ideas via multiple media: laptops, mobile devices, dry-erase whiteboards etc.
- Encourages students and professors to physically move around the class - which increases student –to-student and student-to-faculty interactions.

Comfortable - Supports Health, Well-being, and Safety

Known physiological attributes that are conducive learning and well-being are part of classroom design wherever possible (Barrett, Davies, Zhang, and Barrett, 2015).

- Natural lighting
- Ability to control room lighting (to optimize projection)
- Stable temperature
- Ergonomic, light furniture (to avoid strain when moving or using it
- No clutter (to avoid busy patterns on flooring and walls)
- Blinds (to avoid whiteboard glare from excessive light from windows)
- Optimal personal space (to move in chair, use device without concern of it dropping off desk)
- Space to put coats and backpacks (to avoid clutter and tripping hazards)
- Optimized acoustics (to lower stress and avoid voice strain for professors. Minimal noise from ventilation, classroom chatter is muted rather than amplified. In large classrooms, wireless headset microphone provided to avoid professor voice strain and allow flexible movement)
- Ability for students and professor to move around the class (to increase blood flow and reduces lethargy for effective brain functioning)
- Avoidance of tripping hazards (e.g. laptop cable connections are not in line of traffic
- Optimal indoor air quality

Accessible - Supports Learning that is Inclusive and Accessible for All Students

- Avoids sight lines in which some students have a poorer learning experience than others (e.g. golden zones vs shadow zones of a cathedral-style, rowed-desks classroom. Park and Choi, 2014)
- Supports students with various needs (e.g. wheelchair access, vision, auditory etc.)
- Student seating provides accessible pathways for faculty/student and student/student interaction

Flexible - Supports Range of Active Learning Activities

- Moveable furniture suitable for various configurations
- Furniture with wheels allows for quick reconfiguration of desks and chairs to support various learning activities.
- Nesting and folding furniture for rooms that need to accommodate moderately sized and smaller sized classrooms

Connected – Information Sharing and Virtual Connection with Others

- Students and faculty can connect to information and resources via Internet
- Students and faculty can connect with others remotely via conferencing
- Students and faculty can share work and web resources with each other (e.g. via laptop, wireless connection to screens, via collaborative documents, via discussion forums in the Learning Management System etc.)

Scalable

- Teachers are supported to explore active learning and flexible teaching practices via professional development activities
- Classroom technology can be supported by Information Technology Services (ITS)
- Classroom features are responsive to operational realities and changing needs of the college

EXISTING CLASSROOM STANDARDS

Current Classroom Types

1. Laptop
2. Standard (formerly called Mobile)
3. Collaborative
4. Active Learning
5. Active Seating

Standard

This is the most common type of classroom across all campuses. These classrooms are currently called "mobile". While the original intention of the "mobile" name was to denote their ability to support BYOD, many people associate this word with moveable furniture. Furthermore, since BYOD is considered to be ubiquitously supported across all classrooms, renaming the "mobile" classroom as "standard" may be more accurate.

NOTE: There are several theatre-styled classrooms, with tiered seats, that are larger capacity (e.g. 90 – 120 students). Feedback also suggests that they are the least flexible and comfortable classrooms at Algonquin.

Laptop

To be phased out. Most laptop classrooms have been converted to mobile. However, eight of these classrooms still remain. These classrooms provide wired connections to the internet and power to all students. With the increased reliability of wireless internet on campus, requests for mobile classrooms are increasingly being accommodated by this room. These rooms are candidates for upgrades.

Active Learning

This type would combine collaborative and active learning classrooms since they both focus on a learner-centred, activity-focused approach to teaching.

Active Seating

Six of these classrooms exist and are used primarily by FSL/ESL programs. They tend to be small capacity rooms (e.g. around 23 students). They are not in demand by other programs, though it is possible that their existence is not well known.

Classroom Technology Standards

CLASSROOM TYPE	COMMON STANDARD TECHNOLOGY	MULTIMODAL STANDARD	ENHANCED DIGITAL DISPLAYS
			Additional technology to support wireless screen sharing from teacher and student computers. (Replaces pull-down screen and projector)
	• Desktop PC with mouse and keyboard • HDMI to connect laptops • 24" monitor on adjustable arm • Extron DPV (digital pole vault) AV control system • LED projector 109" Pull-down screen Standard IP phone	• 1-2 PTZ cameras • 1 document camera (with audio and swivel • Secondary touch-screen – (whiteboard alternative) • Microphone array • Two confidence monitors (back of classroom) • Touch panel to control in room equipment *other options are being explored as part of Multimodal Classroom 2.0 upgrades. Final standards will be confirmed by Fall, 2023.	• 3 – 4 LCD displays (depending on classroom configuration, there could be more) * Wireless display capabilities • Touch panel that allows for video signal routing to the multiple displays • Standard IP phone
LAPTOP	✔	X	X
STANDARD (formerly called mobile)	✔	Ottawa – B232, T327, CA205, A150, B110, B130, H214, J217, P201, T334, T232*, B156* Pembroke – 329, 213 Perth – 101c	X
COLLABORATIVE	✔	X	X
ACTIVE SEATING	✔	X	X
ACTIVE LEARNING	✔	T232, B156	C150, B156, T232

Classroom Furniture

FURNITURE	LAPTOP	MOBILE	COLLABORATIVE	ACTIVE SEATING	ACTIVE LEARNING
Student desks	24"x60" All tables are fixed	Single table (24"x60") at wall is fixed in rows of 3 or less (Two tables at wall will be fixed in rows of 4 or more) -not on castors	**Layout 1** 36" x 60" tables. Not fixed **Layout 2** 24"x60" tables are fixed (for power)	None	18"x60" tables on castors
Height-adjustable student table	1 height adjustable student table	2 height adjustable student tables (electric preferred)	1 height adjustable student table	None	2 height adjustable student tables (electric preferred)
Student chairs	Chairs (no castors) with padded, material seating	Chairs (no castors) with padded, material seating	**Layout 1** Hard plastic chairs on castors **Layout 2** Padded material chairs on castors	Combo bucket chairs with writing surface on castors	Chairs on castors with mesh seating
Teacher stations	Cabinet-style workstation – not height-adjustable	Cabinet-style workstation – not height-adjustable	Cabinet-style workstation – not height-adjustable	Cabinet-style workstation – not height-adjustable	Height-adjustable teacher station (electric)
Podiums	None	None	None	None	Moveable laptop podium

Room Features

FURNITURE	LAPTOP	MOBILE	COLLABORATIVE	ACTIVE SEATING	ACTIVE LEARNING
Whiteboards	2 at front of class	2 at front of class	Moveable whiteboards on track system	Moveable whiteboards on track system None	White wall whiteboards OR whiteboards on all walls except those with windows
Window blinds	manual	manual	manual	manual	manual
Lighting	Can turn off lights at front for projector screen	Can turn off lights at front for projector screen	Can turn off lights at front for projector screen	Can turn off lights at front for projector screen	dimmable
Accent wall	Green – at front of room	Green – at front of room	Green – at front of room	Green – at front of room	Green – at front of room

FURNITURE	LAPTOP	MOBILE	COLLABORATIVE	ACTIVE SEATING	ACTIVE LEARNING
Power (for students to plug in their laptops)	At perimeter. All tables fixed to support power for all students	At perimeter. One fixed table to support power via extension cords on first or second table.	At perimeter. No power on desks.	At perimeter. No power on desks.	At perimeter. No power on desks. (T232) Ceiling-mounted electrical cables (T150)

Technology Standards for All Open Classrooms

- Desktop PC with mouse and keyboard
- HDMI and USB cables to connect laptops
- 24" monitor on adjustable arm
- Extron DPV (digital pole vault) AV control system
- LED projector
- 109" Pull-down screen
- Standard IP phone

The following technical enhancements would be added on top of the baseline technology standards to certain classrooms – on an as-needed basis.

Multimodal Supported
To support multimodal delivery, standard, laptop, and active learning classrooms are best suited for this technical enhancement.

Enhanced Digital Displays
Classrooms that use multiple digital displays instead of projectors and screens are often placed in active learning classroom. Classroom design literature refers to TEALs – technology-enhanced active learning classrooms – in which multi-screens are used to encourage collaboration and sharing of work. Research is suggesting that lower cost classroom features, such as chairs on wheels and whiteboards, may have a greater influence on student engagement and interaction than expensive technology (Stoltzfus and Libarkin, 2016). Further data collection should be done to analyze use of this technology before further implementation in additional classrooms.

PERIODIC REVIEW OF STANDARDS

Ongoing research, via faculty and student surveys and classroom audits, should be conducted to provide input for updating these standards. Special consideration should be given to understanding the need for accessible features and furniture – including accessible teacher workstations.

REFERENCES

Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. *Building and Environment, 89*, 118-133.

Park, E. L. & Choi, B. K. (2014). Transformation of classroom spaces: traditional versus active learning classroom in colleges. *Higher Education, 68,* 749-771.

Rands, M. L. (2017). The room itself is active: How classroom design impacts student engagement. *Journal of Learning Spaces, 6(1)*, 26 – 33.

Stoltzfus, J.R., & Libarkin, J. (2016). Does the room matter? Active learning in traditional and enhanced lecture spaces. *CBE—Life Sciences Education, 15*(68), 1-10.

Appendix 1: Classroom Design Principles: Supporting Active Learning

CLASSROOMS ARE:	DESCRIPTION	SUPPORTS LEARNERS AND TEACHERS TO
SOCIAL	Supports a Community of Learners	• Move around the class to increase interaction • Discuss, brainstorm work on projects etc.
COMFORTABLE	Supports Health, Well-being, and Safety	• Feel and perform well due to optimal physical conditions (e.g. natural light, air quality, stable temperature, good acoustics, adequate working space etc.)
ACCESSIBLE	Supports Learning that is Inclusive and Accessible for All Students	• Have equal access to instructor for interaction • Have clear site lines • Have special needs accommodated (e.g. height adjustable desk)
FLEXIBLE	Supports Range of Active Learning Activities	• Move certain furniture to suit learning activity
CONNECTED	Supports Information Sharing and Virtual Connection With Others	• Connect with information via Internet • Connect with others remotely via conferencing • Share work with each other (e.g. groups can project work to share with whole class)
SCALABLE	Design is financially and operationally sustainable	• Teachers are supported to explore and adopt active learning practices via professional development opportunities. • Classroom technology can be supported by ITS/AV • Responsive to operational realities of the college • Adaptable to changing needs of the college