

Impacts of Space and Furniture Design on Student Learning

Edmond W.M. Lam*, Irene Wong*, Daniel W.M. Chan*

*SPEED, The Hong Kong Polytechnic University

*Department of Building and Real Estate, The Hong Kong Polytechnic University



Influence of Modern Technologies

- IT technologies > an effective tool for access to, presentation and real-time interactive communications > vast array of teaching opportunities (Collace et al., 2003; Fructher, 1999)
- Traditional teacher-centered teaching in tertiary education student-centered and flexible learning approaches (Brown, 2006; Jamieson, 2003; Jamieson et al., 2001)
- Learning becomes an active constructive process (Jamieson, 2003)
- Interactions with teacher
- Students' active participation and interactivity (Brown, 2006)
- Group activities/discussions are necessary

Space Design to provide facilities that encourage student participation





Built Pedagogy

- "Shape and identity of the relationship within"
 SPACE
- Learning space create an impact on learning approaches (Oblinger, 2006; Lefebvre, 2001; Ceppi & Zini, 1998)
- Built pedagogy defines the teaching mode (Oblinger, 2006)
- User-centred
- Enhance active learning/grouping
- Promote use of provided facilities
- Flexible and adaptable
- Comfortable
- Aesthetic



Furniture Design

- Enhance group work in different sizes
- Facilitate speedy reconfiguration
- Enable multiple use and transformable layout (Fruchter, 1999; Chism & Bickford, 2002; Taylor, 2009)
- Modular table (Cornell, 2002)
- Movable chairs with flexible back, adjustable seat height and adequate foam support (Cornell, 2002)





Fig. 1 Modular furniture



Strategic Plan 2012-18 of The Hong Kong Polytechnic University

- Updating, upgrading and creating innovative learning spaces improve learning environment
- Traditional teaching rooms phanced rooms
- Spaces combined to support different sizes of teaching groups
- Upgraded IT/AV facilities
- New lectern design
- Multiple monitors
- Flexible furniture
- Comfortable, flexible & movable furniture
- Vibrant colours
- Adequate lighting





Modular Furniture



Modular furniture to facilitate group discussion

Vibrant colour to promote learning incentive in BC402

Fig. 2 Renovated Classrooms





Double Swirl Chairs

 Double swirl chairs to facilitate grouping and interaction among students in lecture

theatre



Fig. 2 Double Swirl Chairs in Lecture Theatre N003



Movable Glass Partitions

 Movable glass partitions to reconfigure 3 classrooms into different sizes to facilitate different types/sizes of group activities

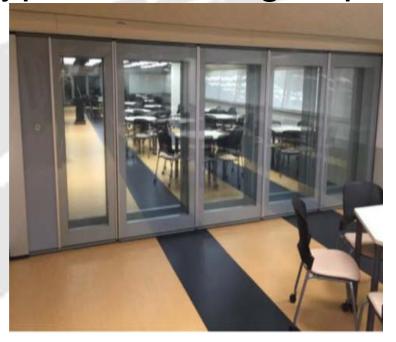


Fig. 4 Sliding glass partitions in N1f classrooms



Adequate Lighting

 A glass wall used in BC404 at PolyU to brighten up the room



Fig. 5 Glass Wall in BC404



Multiple Monitors

 Lecture theatres were refitted into modern, comfortable and technology-enhanced teaching spaces to facilitating active learning

Multiple monitors for better visibility



Fig. 6 Renovated TU201

SPEEL

Assessment of Renovated Learning Space

- Aim:
- > Evaluate the renovated work

Objectives:

- Questionnaire Survey on performance of renovated learning space
- > Collect students' comments on the use of space

SPEED Assessment of Renovated Learning Space

- 500 questionnaires > undergraduates attending classes in the renovated classrooms/lecture theatres
- 402 copies of completed questionnaires (80% return rate)
- Questions are categorized into 6 sections:
- 1. Application of modern technologies
- 2. Flexibility in space design
- 3. Comfort
- 4. Aesthetic
- 5. Continuous assessment
- 6. Overall performance



Overall Performance of the Refurbished Teaching Rooms

- Application of modern technologies can promote active learning
- Students can easily present, modify, record and retrieve information by using the provided facilities
- The new layouts are adaptable for multiple uses
- The space designs facilitate group discussion
- The flexible furniture design allow easy reconfiguration
- Comfortable furniture enhance concentration in learning
- Acoustic improve students' concentration
- Students prefer adjustable lighting level, which can enhance learning



Overall Performance of the Refurbished Teaching Rooms

- Ability to adjust interior temperature is important to learning comfort
- Vibrant color elements can motivate learning
- The created environments are comfortable and enjoyable
- An Assessment System for periodic review on the effectiveness of space design is important for long-term development
- Achieve the purpose of renovation
- Can enhance active learning
- Emphasizes interaction and collaboration among teacher and students





Summary of Questionnaire Survey

Table 1: Students' comments on renovated learning space

	Improvements Work	Comments from students
1.0	Application of modern technologies	
1.1	Upgraded IT/AV facilities	Agreed
1.2	Access to technology, provision of ubiquitous power and data connection	Agreed
1.3	Ease of using the provided facilities	Agreed
2.0	Flexibility in space design	
2.1	The learning space is designed for multiple uses	Agreed
2.2	Space design facilitate group discussion	Agreed
2.3	Use of flexible furniture can facilitate grouping in different sizes	Agreed
3.0	Comfort	
3.1	The chairs with flexible backs and adjustable seat height is comfortable	Agreed
	and enhance concentration in learning	
3.2	The acoustic of the room is satisfactory and improve concentration	Agreed
3.3	Lighting is ambient	Agreed
3.4	Adjustable lighting level can enhance learning	Agreed
3.5	The interior temperature is comfortable	Agreed
3.6	Ability to adjust interior temperature is important to learning comfort	Agreed
4.0	Aesthetic	
4.1	Are flexible furniture comfortable?	Agreed
4.2	Can the use of vibrant colour promote learning incentive?	Agreed
4.3	Does the interior design create a comfortable environment for learning?	Agreed
5.0	Assessment	
5.1	Setting up assessment	Agreed
5.1	Conducting periodic assessment	Agreed
6.0	Overall Performance	Agreed



Conclusion

- IT technologies in tertiary education have induced pedagogical changes
- Teaching mode shifts from teacher-centered to studentcentered
- Active leaning emphasizes collaboration among students
- User-centered classroom is functional, user-friendly, comfortable, psychological appealing and facilitates interaction among students
- Space design should be comfortable, enhance safety and health of users and support information technology
- A comfortable environment motivates learning
- Furniture design should be flexible and multi-functional, allow quick reconfiguration for grouping



Future Research

- Collect comments from teachers teaching in the renovated learning spaces using both traditional teacher-centred and student-centred modes of teaching for comparison
- Study the holistic impacts of learning space design on teaching & learning





Acknowledgement

 The authors gratefully acknowledge the Working Group of Innovative Learning Spaces of The Hong Kong Polytechnic University for providing funding to support this research effort



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