Making It Work: The Effective Use of Acoustics in Learning Spaces

Dr Marian Mahat, The University of Melbourne, Australia, @MarianMahat

Colin Campbell, Saint Gobain Ecophon, Sweden, @EDU_Colin

Academic-Industry collaboration

THE UNIVERSITY OF MELBOURNE

Ecophon® SAINT-GOBAIN

A SOUND EFFECT ON PEOPLE

ilETC INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

Why we need better acoustics in classrooms?

Reduce student learning

Reduce student ability

Increase perceptions of negativity to peers and teachers

Reduce word recognition

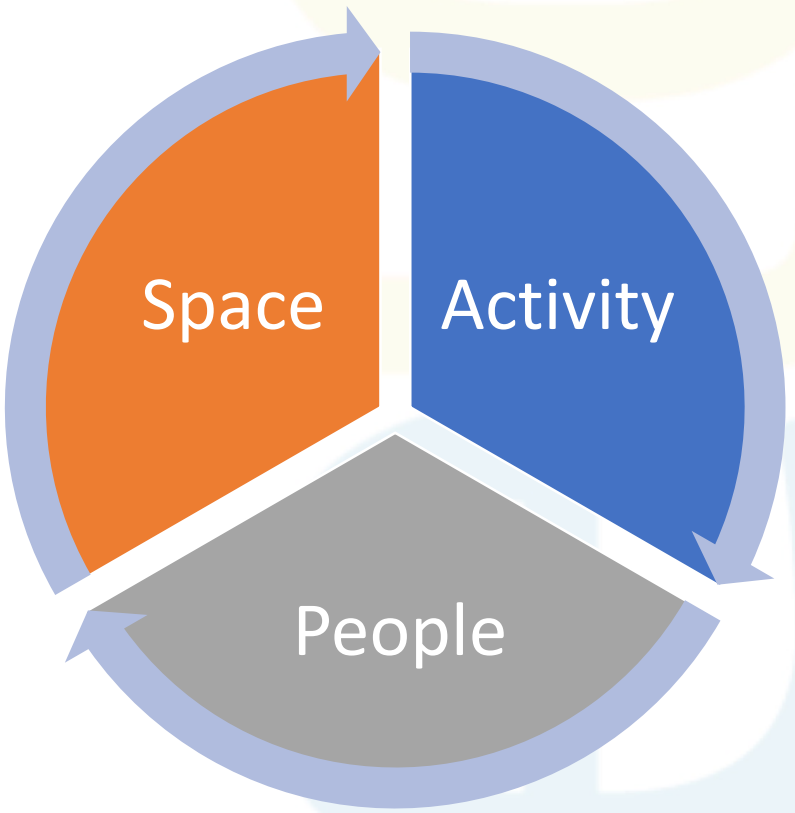
Decrease short term memory

Impair speech perception

Activity-Based Acoustic Design Approach

The Activity-Based Acoustic Design approach centres around three principles of:

- understanding of the nature of ***activity*** taking place;
- consideration of the ***people*** performing the activity; and
- taking into account physical aspects of the ***space*** itself that may contribute to, or distort sound (Ecophon).



Devolved responsibility for learning

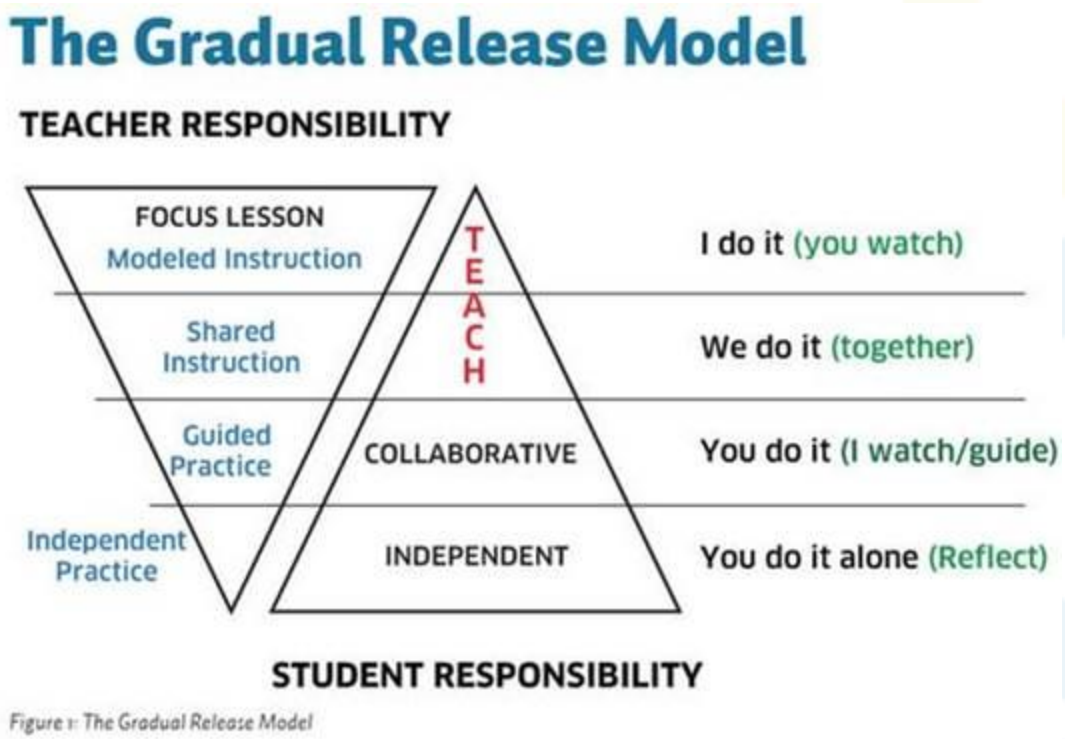
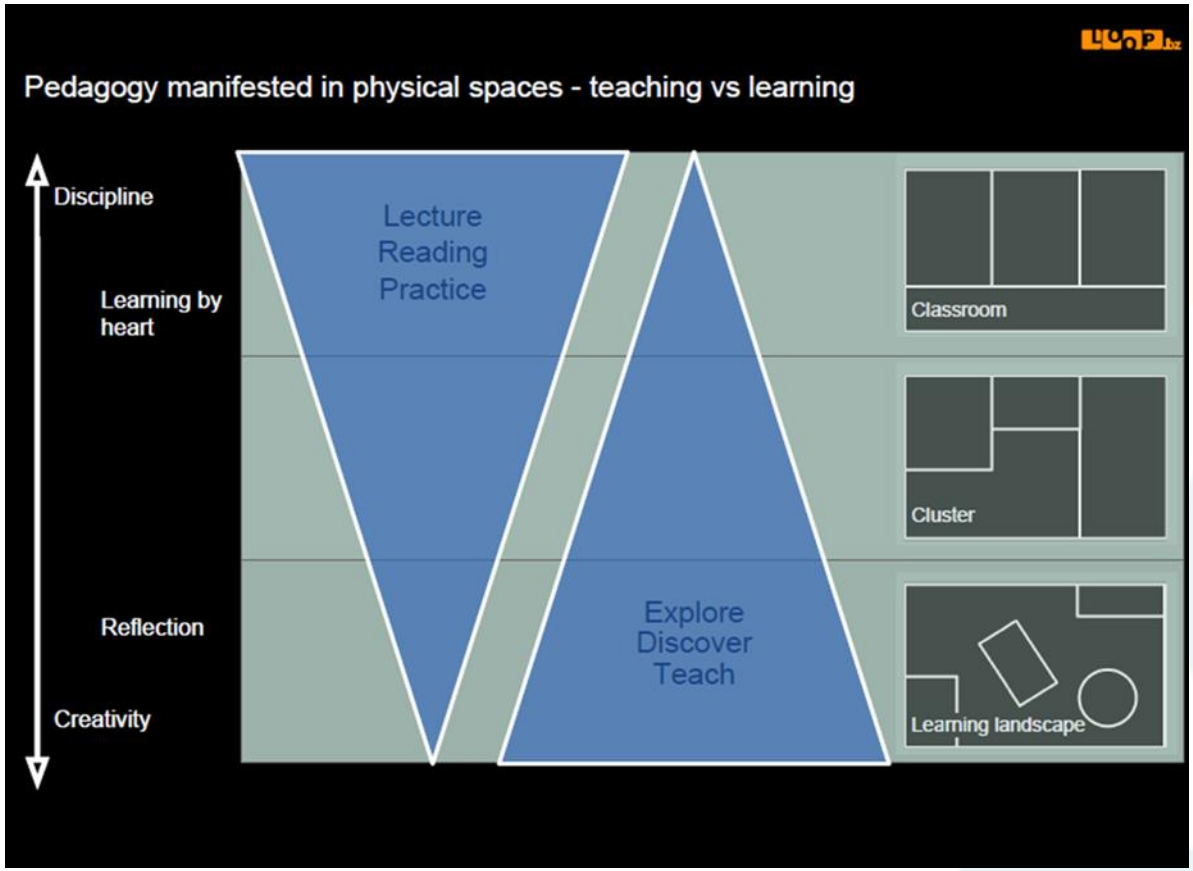
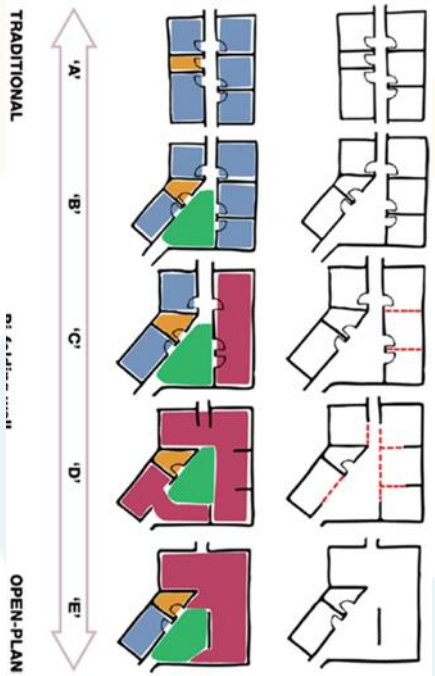


Figure 1: The Gradual Release Model

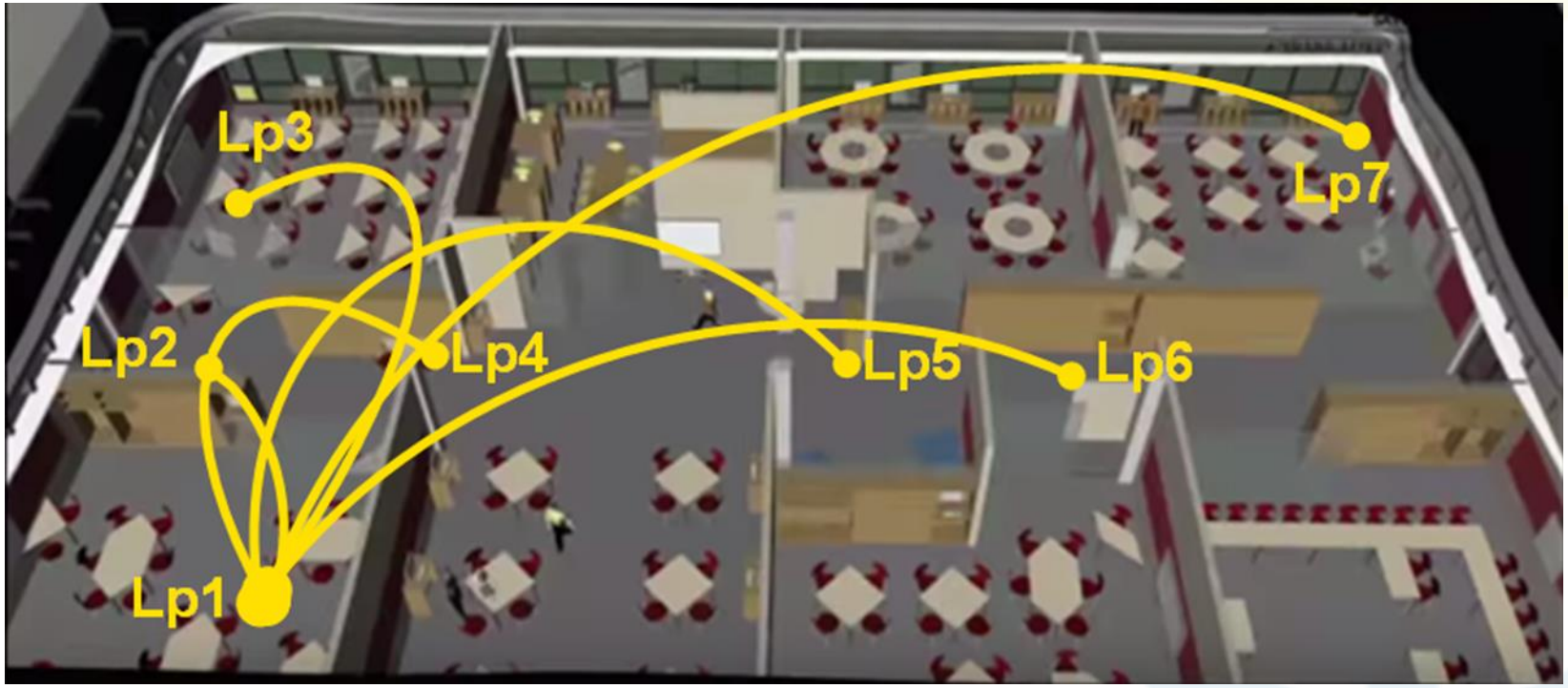
Teaching control vs Learning Freedom



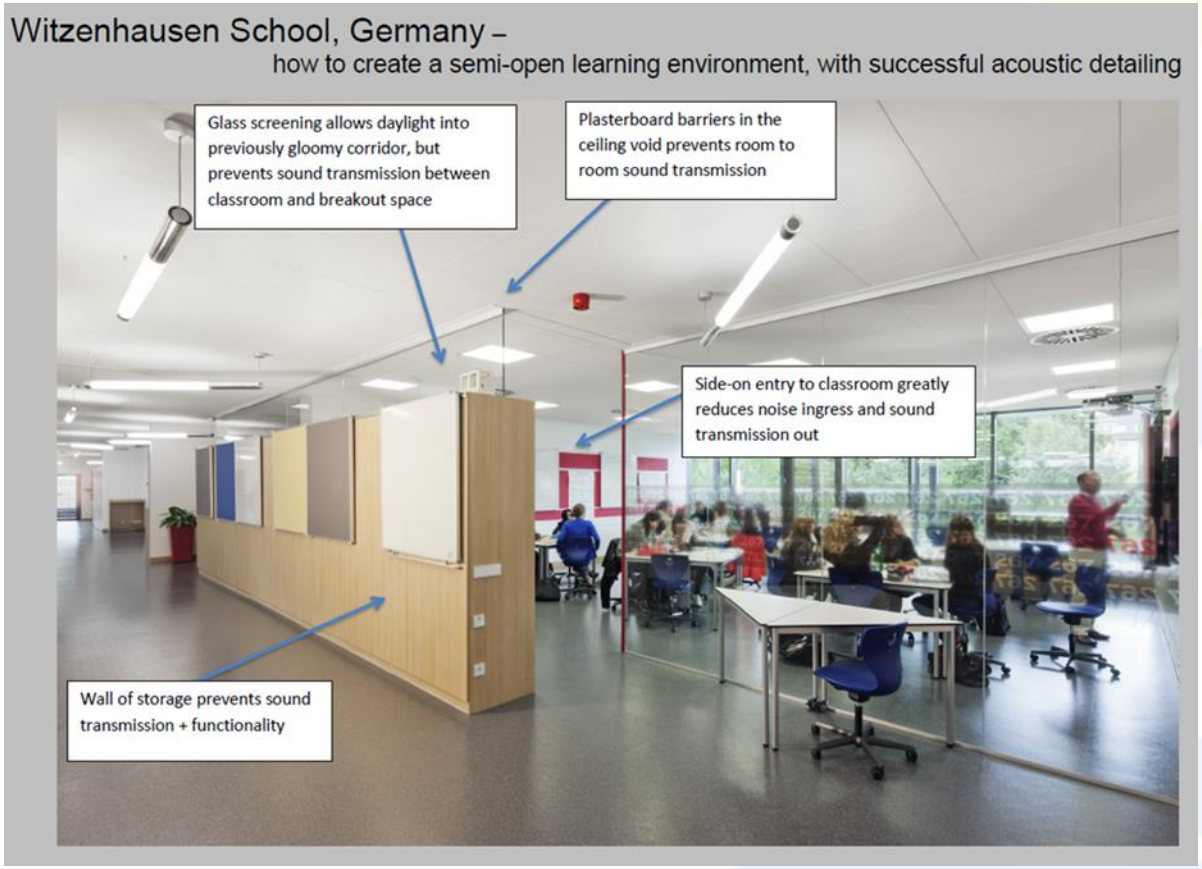


ILETC INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

Case study I: Berufliche Schulen Witzenhausen (Germany)



Typical classroom space



Sound reduction from classroom to classroom

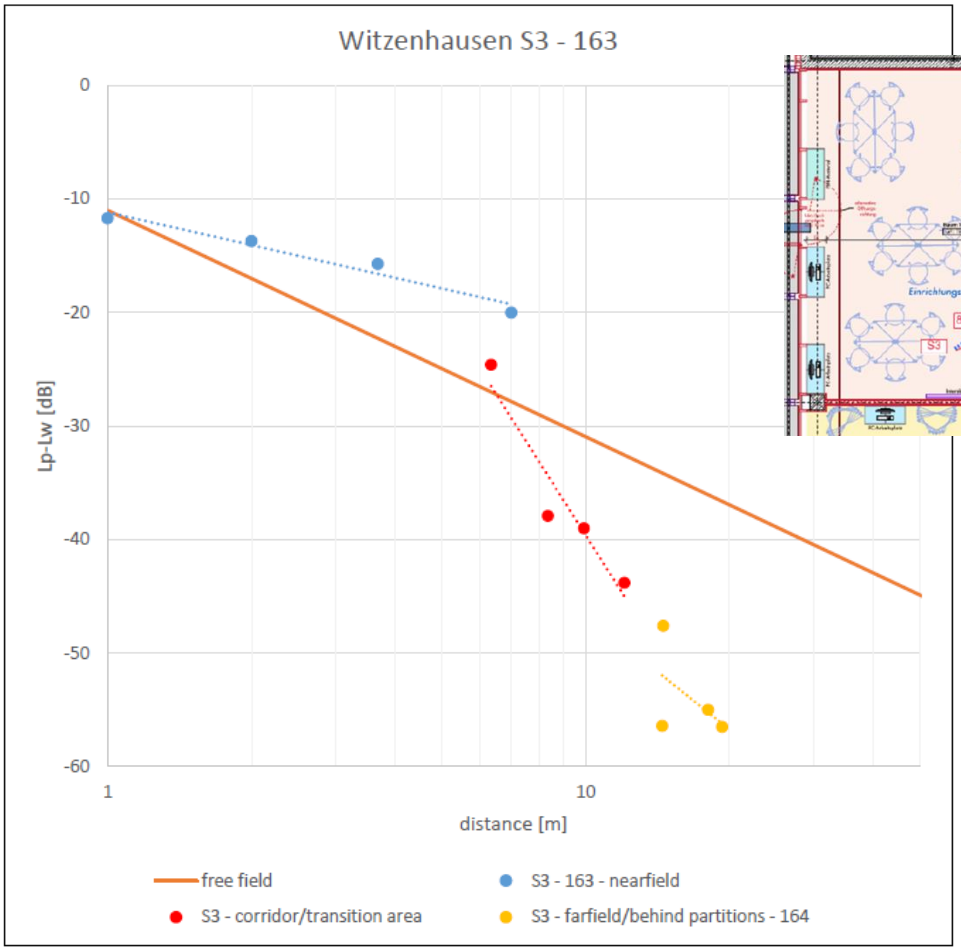
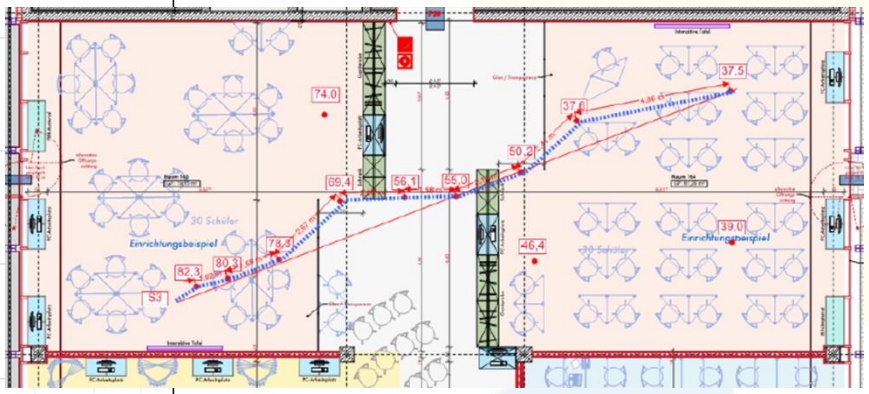


Figure 4.8
Sound propagation along measurement path S3.



RT: 0.48s (Reverberence)

C50: 8dB (Speech clarity)

STI values >0.7 (Good – Excellent)

(Speech Transmission Index)

Corridor:

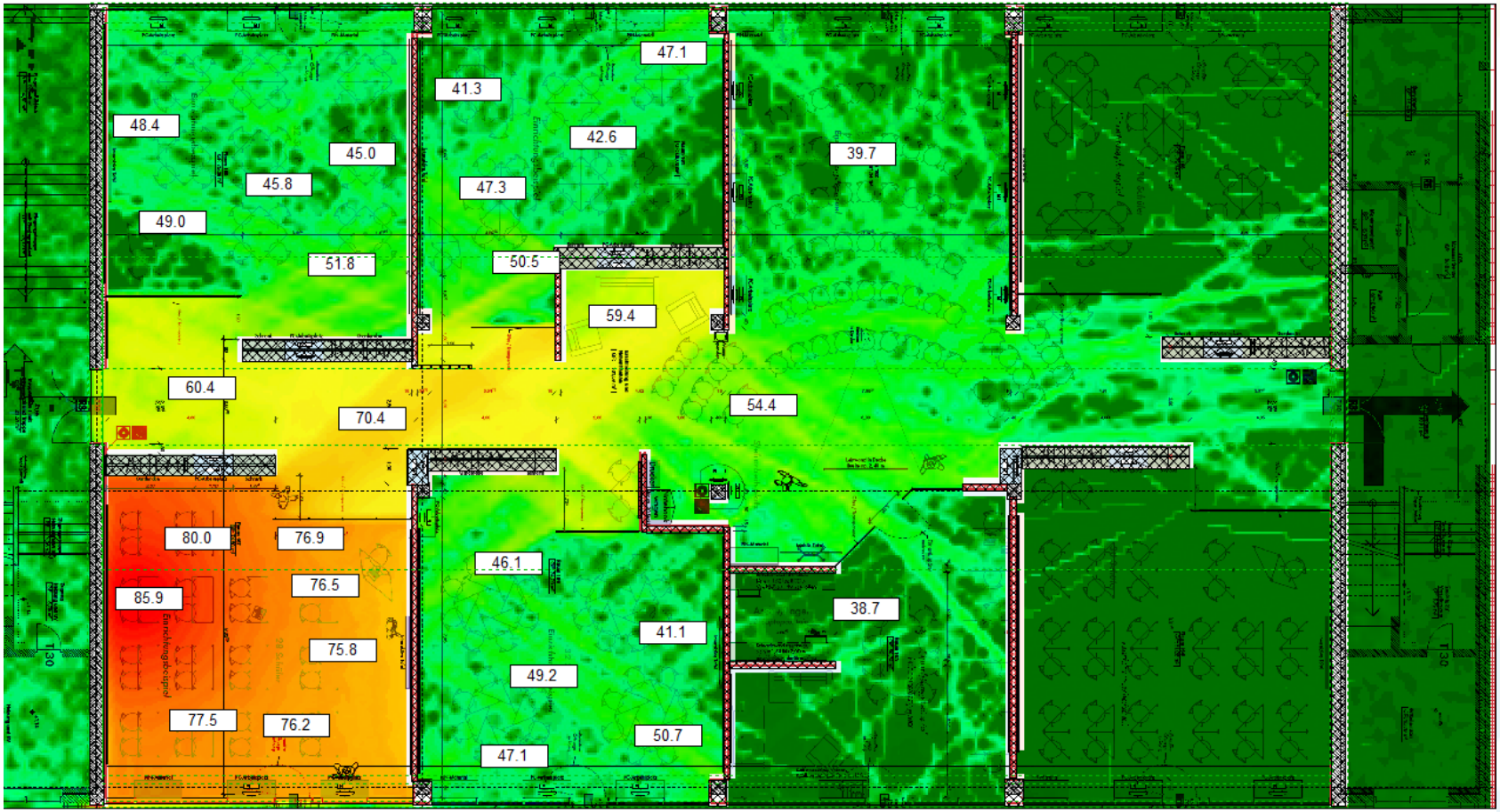
STI values around 0.5 (Poor – Fair)

Adjacent / neighbouring classrooms:

STI values <0.2 (Bad)

ILETC INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

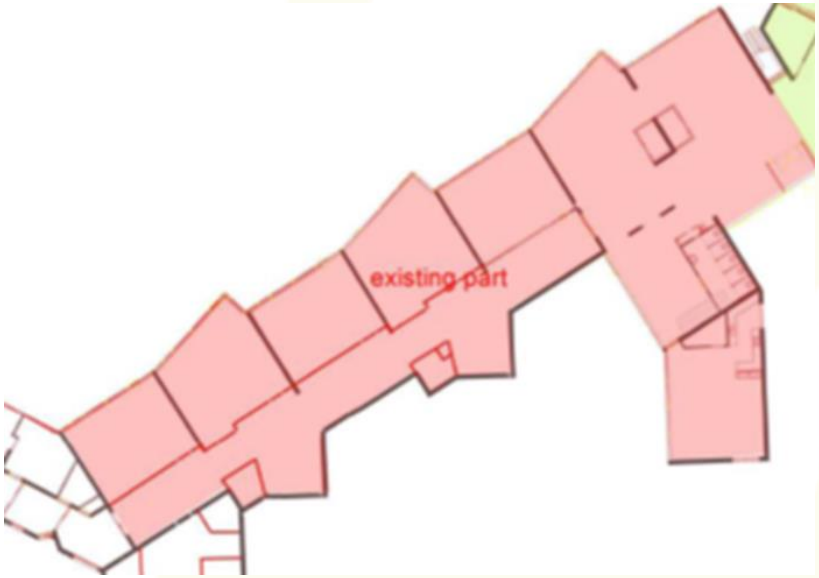
Sound mapping vs speech quality



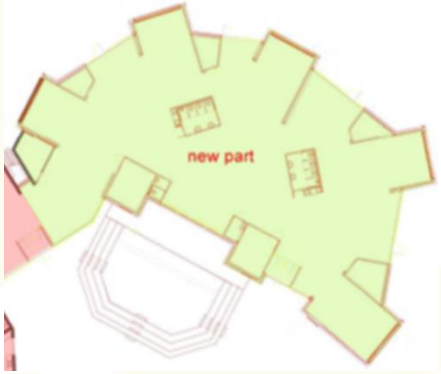
Case study II: De Werkplaats (Netherlands)

- Traditional semi-open and new open learning landscapes

De Werkplaats – Existing building

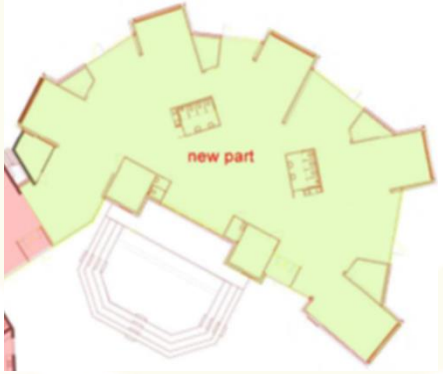


De Werkplaats - New Extension

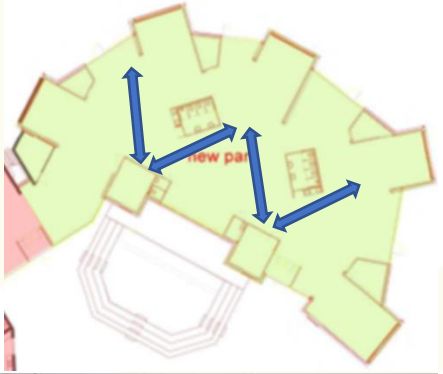


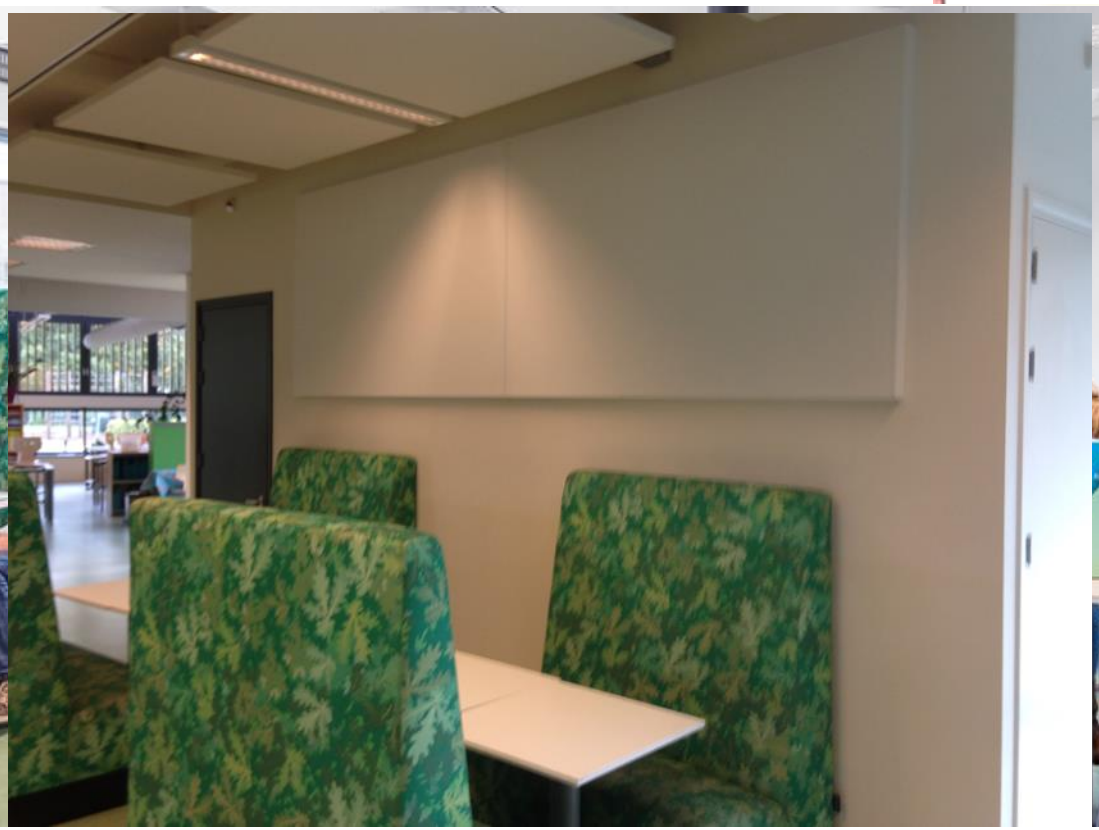
INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

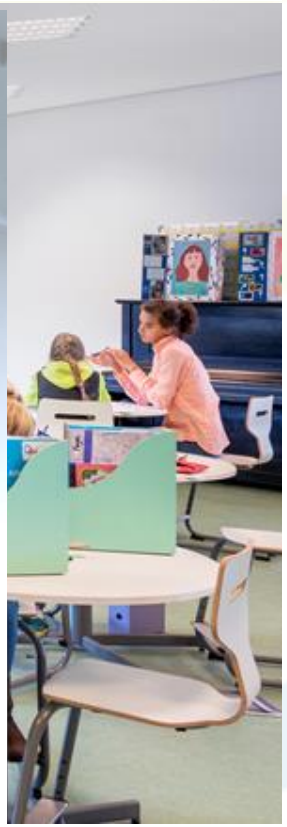
Sound level reduction mapping



More wall absorbers added to reduce class to class disturbance







ileTC INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

Case study III: Col-legi Montserrat (Spain)

ileTC INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

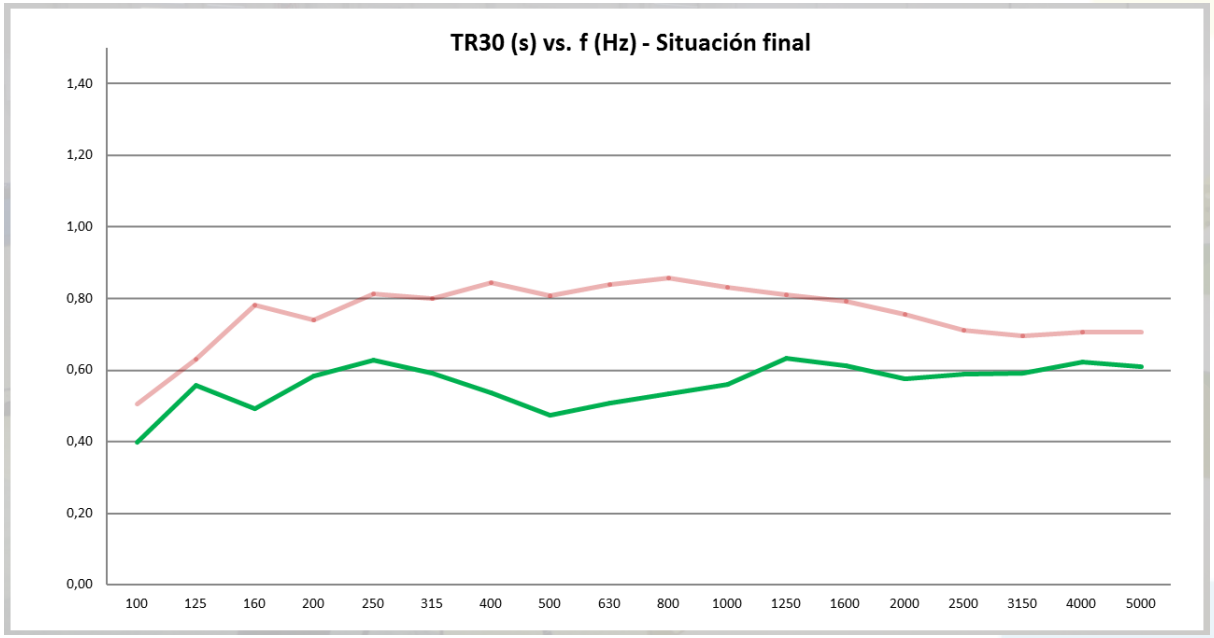
Col-legi Montserrat

INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

Activity-Based Acoustic Design Approach

The initial (and typical) improvements were not good enough;

- learning space was beyond it's acoustic capacity - acoustics improved further.
- acoustic data didn't show any difference but class observations did.



Findings

Organizational evaluation	Leadership/Management behavior and setting	Advice and solutions
Physical environment	Leadership approach	Acoustic treatment
Culture	Learning settings	Design and architecture
Teaching activity	Acoustic products	Organizational management
Learning activity	Teacher / Student-led focus	Training and change management
Teacher personality profiles	Team teaching	Personality profiling
Student personality profiles	Spatial layout and zoning circulation approach	Awareness of preferred learning styles
Individual needs (SEN)	Etiquette / behavior & communication approach	Gaining more participation

Implications

- Organizational culture and core values
- Leadership
- Dedicated teachers

Industry / academic engagement & collaboration in reforming education

Next steps:

- ❑ Systematic literature review on the impact of acoustics on student learning

- ❑ Potential PhD student working closely with the University of Melbourne and Ecophon on acoustics

Contact information

INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE

LEARN

Marian Mahat @MarianMahat
Marian.Mahat@unimelb.edu.au

Colin Campbell @EDU_Colin
colin.campbell@ecophon.se

http://www.iletc.com.au/

iletc INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE