Linking pedagogy and space with ALINA
KU Leuven

- Founded in 1425
- > 45,000 students from 147 nationalities
- > 10,000 staff
- Covering all scientific disciplines

KU Leuven Association

- Founded in 2002
- University of Leuven and associated colleges
- Founded in 1425
- > 100,000 students
  - 43% of Flemish students in higher education
Reuters ranks KU Leuven as Europe’s most innovative university

Europe’s Most Innovative Universities | 2018

#1 KU Leuven Belgium

Website: www.kuleuven.be

Students: 56,351

Academic Staff: 1,107
Active learning increases student performance in science, engineering, and mathematics

Scott Freeman, Sarah L. Eddy, Miles McDonough, Michelle K. Smith, Nnadozie Okoroafor, Hannah Jordt, and Mary Pat Wenderoth

PNAS 111, 23 (2014)
Learning spaces @ KU Leuven Association

Large lecture theatres (> 90 seats)
Learning spaces @ KU Leuven Association

Seminar rooms (< 90 seats)
Stakeholders
Involved in active learning

Lecturers, didactic teams, study counselors, central educational development unit, …

Planners, policymakers, architects, experts in furniture, acoustics, …

Central IT office, technical services

Students, policymakers, staff, …

D. Radcliffe, 2009
M. Veugelers, 2017
Different perspectives on active learning

Common ground: qualitative education

Active / collaborative learning works!

Insufficient relevant best practices
Lack of facilities
User-friendly
Lack of (technical) support

Pedagogy

Engagement
Empowerment

Technology
Ease of use
Confidence

Space

People

Change management!

Space influences pedagogy
Pedagogy is no criterion for assigning rooms
Pressure on existing rooms
Lecturers do want more NGC’s
Lack of extrinsic motivation
Attract students to campus

Involvement of all stakeholders!

D. Radcliffe, 2009
M. Veugelers, 2017
Summarised:

- Reduced demand for active learning spaces
- Limited implementation of active learning spaces
- Lack of use of innovative teaching practices
- Cultivation of traditional teaching habits & methods
Cause?

- Reduced demand for active learning spaces
- Cultivation of traditional teaching habits & methods
- Limited implementation of active learning spaces
- Lack of use of innovative teaching practices

Vicious circle
Cause?

Teaching methods
Those who teach and try to improve teaching

Limited implementation of active learning spaces

Space
Those who design learning spaces and try to improve them

Cultivation of traditional teaching habits & methods

Lack of use of innovative teaching practices

Reduced demand for active learning spaces
You're going to have to change to fit into the system.

Or how about you change the system so we can all fit?
What we actually want:

- Demand for active learning spaces
- Cultivation of innovative teaching methods
- Implementation of active learning spaces
- Introduction and expansion of innovative teaching practice
Pedagogy

Lecturers
Teaching assistants
Tutors
Students
Educational developers
...

ALINA
Negotiator
Translator

Space

Policy makers
Educational technologists
Planners
Technical services
Architects
...

Science, Engineering and Technology Group
Pedagogy

- Lecturers
- Teaching assistants
- Tutors
- Students
- Educational developers
- ...

ALINA
Negotiator
Translator

Space

- Policy makers
- Educational technologists
- Planners
- Technical services
- Architects
- ...

5 interventions

Multidisciplinary taskforce
Recommendations for policymakers and lecturers
The ALINA model & proof of concept
Coaching trajectory for didactic teams
Guidelines for (re)building active learning spaces
1. Multidisciplinary taskforce

- Goals:
  - Networking
  - Mutual understanding
  - Transparency
  - Holistic approach
2. Recommendations

For policymakers

- Start from a clear and holistic vision and remain faithful to this vision.
- Involve all possible stakeholders from the beginning.
- Appoint a taskforce or a person as an ambassador of next generation spaces.
- Define ownership.

For lecturers

- Start today with challenging, activating, stimulating your students.
- Give yourself time and space for trial and error to grow in your role as a ‘coach’.
- Do not underestimate the influence of student attitudes.
- Communicate with colleagues, exchange experiences.
- Use the available technical and didactical support.
3. The ALINA model & proof of concept


Lecturers search for a suitable learning space for their didactic methods

Lecturers search for inspiration on didactic methods in a certain learning space

Policy makers optimise their learning spaces according to desired didactic methods

Policy makers consult user data, visualising lecturer needs and interests in a dashboard
4. Coaching trajectory for didactic teams

- Triple win:
  - Didactic teams receive support for all aspects of active learning
  - Educational development unit gain experience and knowledge
  - Technical services receive direct feedback

D. Radcliffe, 2009
M. Veugelers, 2017
5. Guidelines for (re)building active learning spaces

- Designing
- Building
- Space
- Using
- Pedagogy
5. Guidelines for (re)building active learning spaces

- Designing
- Building
- Using

Pedagogy
Space
Demand for active learning spaces

Cultivation of innovative teaching methods

Positive spiral

Implementation of active learning spaces

Introduction and expansion of innovative teaching practice
Thank you!

…Questions?

“I expect you all to be independent, innovative, critical thinkers who will do exactly as I say!”

Evert.Binnard@kuleuven.be
Iris.Peeters@kuleuven.be
References and further reading


Backup slides

Iris Peeters, Evert Binnard
Transitions 18, Copenhagen
16 November 2018
Frequency of used teaching methods in a traditional learning space vs. an active learning space.
Teacher survey: Teaching method: current versus desirable use
850 respondents (2015)

Error bars: 95% CI
p < 0.001
Teacher survey: Learning space: current versus desirable use
850 respondents (2015)

Error bars: 95% CI
\( p < 0.001 \)

Desirable
Current

Large auditoria
N = 614

Seminar rooms
N = 585

Computer lab
N = 545

Lab
N = 527

Atelier
N = 517

Conference room
N = 513

Flexible space
N = 505

Outside
N = 448

Active learning space
N = 503
Learning spaces @ KU Leuven Association

Collaborative spaces

- Introduced after evaluation of existing asset of rooms in 2012 and the pedagogical need to activate students
- Rollout has been slow due to
  - lack of existing large flat spaces (>100 m²)
  - need for more space per student
  - lack of a shared vision of innovation in learning
- Incorporated in new educational buildings for the coming years (2017-2019)
Learning spaces @ KU Leuven Association

Library Learning Centres

- Group work facilities, flexible furniture
- Informal spaces (lounge, coffee corner)
- Lending services (laptops, tablets, beamers, etc.)
- Events (hackathons, business games, etc.)
Lcie: A university-wide initiative (since 2014) to promote, stimulate and support entrepreneurship **with and by** students, researchers, professors and alumni.
Learning spaces @ KU Leuven Association

Innovation spaces

Library

Learning centre

Innovation space

Reading

Learning

Doing

Researcher

Student

Team

Formal

Flexible

Ecosystem

Science, Engineering and Technology Group
Learning spaces @ KU Leuven Association

Entrepreneurship spaces

- Student driven initiatives supported by the university
- Co-working
- Project-based learning

Incubator  Workspace  Creativity Lab
Improved Learning in a Large-Enrollment Physics Class

Louis Deslauriers,¹,² Ellen Schelew,² Carl Wieman*†‡

We compared the amounts of learning achieved using two different instructional approaches under controlled conditions. We measured the learning of a specific set of topics and objectives when taught by 3 hours of traditional lecture given by an experienced highly rated instructor and 3 hours of instruction given by a trained but inexperienced instructor using instruction based on research in cognitive psychology and physics education. The comparison was made between two large sections (N = 267 and N = 271) of an introductory undergraduate physics course. We found increased student attendance, higher engagement, and more than twice the learning in the section taught using research-based instruction.

- Preclass reading assignments & quizzes
- In-class clicker questions with student-student discussion
- Small-group active learning tasks
- Targeted in-class instructor feedback
Active learning increases student performance in science, engineering, and mathematics

Scott Freeman\textsuperscript{a,1}, Sarah L. Eddy\textsuperscript{a}, Miles McDonough\textsuperscript{a}, Michelle K. Smith\textsuperscript{b}, Nnadozie Okoroafor\textsuperscript{a}, Hannah Jordt\textsuperscript{a}, and Mary Pat Wenderoth\textsuperscript{a}

To test the hypothesis that lecturing maximizes learning and course performance, we metaanalyzed 225 studies that reported data on examination scores or failure rates when comparing student performance in undergraduate science, technology, engineering, and mathematics (STEM) courses under traditional lecturing versus active learning. The effect sizes indicate that on average, student performance on examinations and concept inventories increased by 0.47 SDs under active learning ($n = 158$ studies), and that the odds ratio for failing was 1.95 under traditional lecturing ($n = 67$ studies). These results indicate that average examination scores improved by about 6\% in active learning sections, and that students in classes with traditional lecturing were 1.5 times more likely to fail than were students in classes with active learning. Heterogeneity analyses indicated that both results hold across the STEM disciplines, that active learning increases scores on concept inventories more than on course examinations, and that active learning appears effective across all class sizes—although the greatest effects are in small ($n \leq 50$) classes. Trim and fill analyses and fail-safe $n$ calculations suggest that the results are not due to publication bias. The results also appear robust to variation in the methodological rigor of the included studies, based on the quality of controls over student quality and instructor identity. This is the largest and most comprehensive metaanalysis of undergraduate STEM education published to date. The results raise questions about the continued use of traditional lecturing as a control in research studies, and support active learning as the preferred, empirically validated teaching practice in regular classrooms.
Large-scale comparison of science teaching methods sends clear message

Carl E. Wieman

PNAS 111, 23 (2014)

Should the goals of STEM education research be to find more effective ways for students to learn or to provide additional evidence to convince faculty and institutions to change how they are teaching? Freeman et al. do not answer that question, but their findings make it clear that it cannot be avoided.

...Interactive-engagement methods!