

# **The Case for Active Learning Environments in University Education**

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## **Executive Summary**

Student-centred active learning environments are changing learning and teaching for the better. As universities come under pressure from increased fees and on-line alternatives such as MOOC's (Massively Open Online Courses), active learning plays to the social strengths of people and relationships where teamwork and talking to solve complex problems are key.

"What I hear I forget, what I see I remember, what I do I understand."

Xunzi

Replacing outdated lecturing, active learning delivers benefits to students, instructors, and universities:

Students enjoy learning more and achieve better outcomes

Students are better equipped with transferable skills for employment, research or continuing education

Technology sets instructors free from the tyranny of lectures to use their time and expertise more productively

Universities attract students and maintain income streams

Active learning Improves learning and teaching, enhances the student experience, and can help achieve better space utilisation targets. These represent three of the four most frequent strategic aims of university management boards.

At their annual conference in June 2013, the European Foundation for Management Development reported that in most cases Universities are not ready for change, but that the new teaching methodologies and on-line competition are not going to go away.

Active learning provides an opportunity for students to develop the depth and critical power of their learning, and this must be embraced by universities, as they prepare students for employment, research or continuing education.

## **Background**

### **Lecture Theatres Aren't Working**

Traditional lecture theatres were designed to enable large numbers of high calibre students to receive content and academic wisdom. It's not uncommon for students to sit and listen to words being read verbatim, without any visual reinforcement or interaction.

As the more-able students are always inclined to enter university, increasing student numbers inevitably results in a greater range of student abilities. Lectures fail to meet the needs of less-able students because this form of instruction:

- Treats all students as if they are equal

- Is not effective for retaining knowledge

- Doesn't sufficiently engage students, resulting in poor attendance and feedback

- Is inadequate for individual assistance

When not in use for lectures, tiered lecture theatres do not have any other purpose.

In the increased fees environment post 2012, there is a need to manage and practically account for student expectations with regard to both contact time, and the quality of teaching.

In the USA, over 200 universities and colleges have adopted active learning initiatives that have delivered dramatic improvements in every aspect of learning. New learning environments enable large student groups sharing a single space to work in small teams, collaborating with visual information and creating knowledge as they learn from each other and their instructors.

Students can jointly edit each other's work when displayed on the team screens, or share their content with the whole class via class screens arrayed around the room, or team screens located on each table.

The SCALE-UP programme developed by Professor Bob Beichner at North Carolina State University was initially designed for teaching physics to introductory college courses in a highly collaborative, hands-on, computer-rich environment.

Instead of passively listening to lecturers, students are set tasks that actively engage them in finding solutions through discussion and various team working methodologies. High-quality audio visual facilities are essential for providing access to on-line resources and fully supporting the participation of every student, resulting in deeper learning and an enhanced undergraduate experience.

Research<sup>1</sup> into the SCALE-UP outcomes over many years has determined that students:

Ability to solve problems is increased

Conceptual understanding is increased

Attitudes are improved

Failure rates are drastically reduced, especially for women and members of minority groups

“At risk” students do better

SCALE-UP now stands for **S**tudent **C**entred **A**ctive **L**earning **E**nvironment with **U**pside-down **P**edagogies. Other acronyms exist for what is essentially the same pedagogy for increasing student engagement and outcomes in this way.

TEAL at MIT = Technology Enhanced Active Learning

TBL at the University of Bradford = Team Based Learning

TILE at IOWA = Transform, Interact, Learn, Engage

The ‘Upside-Down’ element relates to the fact that information that would previously have been delivered as a lecture, is now provided as pre-session course work which students complete before the team-based learning class takes place. This is also known as the ‘flipped classroom’ or ‘reverse instruction’ model of teaching, as suggested by Beichner himself, and others including Salman Khan (Khan Academy), Jonathan Bergmann (Flippedlearning.com), Aaron Sams (Sams Learning Designs), and others.

There is no single best way to teach a class. However, some instructional methods have been shown through research to enhance learning gains by students, especially at deeper levels of Bloom’s Taxonomy<sup>2</sup>.

Instructional strategies such as collaborative learning,<sup>3</sup> problem-based learning,<sup>4</sup> and team-based learning,<sup>5</sup> depend upon successful interactions between students working together in a supportive community.

Traditional classrooms do not facilitate such student interaction, and whilst instruction in traditional lecture theatres can be improved by such methods,<sup>6</sup> the improvement occurs in spite of the environment.

Active Learning classroom environments remove some of the barriers that prevent instructors from implementing multiple pedagogical innovations both via furniture and philosophy.<sup>7</sup>

## **Academic Benefits**

Students learn more in active learning rooms, forming closer contacts with their peers and instructors. A short 'lecture' with instruction to set the scene takes place in the same room as group learning. 'Students enjoy the classroom experience and they are fully engaged with the learning process.'<sup>8</sup>

Failure rates are reduced and academic outcomes for the best students are increased. There is no 'back of the class' where students can hide, and peer pressure that comes from having to present a team project on screen and discuss it live with the whole class. Whilst technology enables such interactions, the key dynamic is from students becoming tutors and instructors becoming coaches.

Active Learning leads to increased engagement and attendance, higher learning outcomes, and closer instructor/student relationships; almost as colleagues. The consistent message from multiple studies is that active learning – the engaging spaces and the pedagogical methods – provide a much more enjoyable and challenging learning experience for students.

The benefits of increased attendance, engagement and attainment have been replicated at universities and colleges across the USA, Australia and the Far East.<sup>9</sup>

## **Developing Active Learning Spaces**

The most obvious features of active learning are student-centred tables and technology. Technology in this case means anything that is used as a tool to facilitate visual learning; displays, whiteboards, projectors, and microphones so that all students can both hear and be heard.

In most American active learning environments, nine students typically sit in groups of three around tables that are seven feet in diameter. The size of the round tables is not an accident; multiple iterations revealed that tables smaller than seven feet made the students cramped, while tables larger than seven feet prevented table-wide discussions.<sup>10</sup> Three-person groups are typically used because of previous research,<sup>11</sup> although other sizes of groups could also be facilitated.

Each group of three students share a lap-top, but the 'group' display is away from the table either fixed to the wall or on a mobile mount.

With nine students on each table working in 3 separate teams, their immediate proximity, noise pollution, etc. must interfere with the work of the other two teams. Research has also shown that collaboration reduces when teams number more than six, as a larger group, as one example, provides an opportunity for some members not to fully contribute. Nine students on one table may have a similar effect, especially when all groups are working simultaneously on the same material.

## The UK Experience

In the UK, which is only now, 16 years after SCALE-UP was launched at North Carolina State University, beginning to implement active learning environments, round tables have so far failed to find favour.

The choice of smaller tables, with just one larger team of 5-6 students, meets several needs. These fit into smaller rooms that would not accommodate the required number of round tables. Each table can have a dedicated integrated display. Teams of six or fewer work better collaboratively. Even where educators want to follow the methodology of having 9 students on a table, large plectrum-shaped tables that integrate the display are being used.

At the University of Bradford, an 18 table (108 Student capacity) Team Based Learning room was installed in the faculty of Life Sciences during summer 2012, specifically for the learning of Pharmacy. The room has proved so successful that their 1<sup>st</sup> year undergraduates, faced with conducting their second year studies in traditional rooms and lecture theatres, argued for the provision of a second room.

To be successful, instruction in an active learning environment must highlight the students' learning rather than the instructor's lecturing. Therefore, there is no "front" to the classroom and ample space for teaching staff to circulate amongst the students asking questions and being on-hand for when support is needed. Working in exactly this way, the TBL room at the University of Bradford<sup>12</sup> has been incredibly successful.

Right from the outset, Bradford realised that the success of their TBL room was ultimately reliant on the Audio Visual and IT enabling the full inclusivity and participation of **every** student.

YouTube Video of Bradford's TBL Room

[http://www.youtube.com/watch?gl=GB&hl=en&client=mv-google&v=VwgE\\_3lMaTY&nomobile=1](http://www.youtube.com/watch?gl=GB&hl=en&client=mv-google&v=VwgE_3lMaTY&nomobile=1)

## **A Catalyst for Change**

“Change is a problem because it unsettles people, but sometimes unsettling people gives them a fresh start.”<sup>13</sup>

The benefits of active learning environments reach beyond just the learning and teaching itself. With competition from on-line education, social interaction is the one key Ace that university education still has up its sleeve, and active learning uses this advantage like never before. With so many UK universities positively looking to develop active learning strategies, the positives to the organisations must be clearly grasped.

**Provide** a more inclusive and supportive learning environment that enhances the student experience

**Underpin** higher academic achievements through supporting a deeper subject and concept understanding

**Develop** real transferable employability skills; problem solving, team work, critical thinking, etc.

**Make** better use of space as rooms can be used more extensively than lecture theatres

**Reduce** the number of drop-outs so that students attain their qualifications, and universities protect important income streams for the remaining years of courses.

## **Instructor Training**

A key component of introducing active learning environments is that instructors **must** undergo intensive training before they are allowed to teach their courses in these learning spaces. It is vital for instructors to learn how to use the visual and audio tools in the classrooms to support active learning and student construction of knowledge.

Ineffective use of active learning spaces compromises the investment by reducing student attainment, and a 2-3 day formal course that emphasises the integration of new pedagogies with the room facilities and setup, including the likely challenges involved in designing and implementing the activities, should be the standard.

Many challenges exist for academics that have spent too many years at the front of lecture theatres and subsequently marked examination papers.

How to convert existing lectures into meaningful activities

Preparing students with information for active learning

Determining how to create and sustain successful groups

How to assess students' progress

What to do if things go wrong

At IOWA State University, existing and new instructors alike undertake a 3-day TILE workshop (Transform, Interact, Learn, Engage) to prepare them for active learning methodologies.

In institutions with just a small number of active learning environments, typically rooms are only bookable for use by instructors that have undergone the necessary training, and therefore not part of any centralised booking arrangement.

### **Risk Assessment**

Individual projects will need their own analysis based on costs and other factors, but as an overview for considering the implementation of Active Learning Environments, questions you might ask are:

Does this fit within the University's Strategic Aims?

Better Student Experience	YES
Better Academic Outcomes	YES
Develops Transferable Skills	YES
Maintains Student Income Streams	YES
Does this help with space utilisation?	YES

Typically fewer students can be accommodated in an active learning environment compared to a lecture theatre, but spaces can be used for elements of lecture, team work and presentations and for longer periods over the academic day.

Is organisational change required YES

Change must be supported by senior management, and with the correct support and training can be very positive.

Is a change in Pedagogy Required? YES

There must be a formal programme for developing and training on new teaching strategies to ensure that the benefits of Active Learning Rooms are deliberately used.

## **Economic Investment**

Active Learning Environments are more expensive than non-technology areas. Technology that is the most 'invisible' provides the best experience, but is also the most expensive. However, where installations have been made with expensive technology and better-than-normal furniture, students consistently treat the facility with more respect, and on-going maintenance and refurbishment costs are lower.

Enhanced use of technology in these specially equipped rooms can act as a catalyst for improving the use of technology in all teaching spaces. Students are now arriving at university having experienced the use of interactive whiteboards in every high school classroom. There is much publicity about the increasing student fees and the high cost of a university education, and yet the first experience is often of worse facilities than they had at school – which was perceived as being free.

High quality and educationally effective active learning rooms should be positioned high when marketing the student value and experience to prospective students and their parents.

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## **About Duncan Peberdy**

Duncan is the learning spaces specialist for TOP-TEC, and would be very pleased to meet with you if you are considering the implementation of active learning spaces.

Duncan is the co-author of Brilliant Meetings, published by Pearson in 2009, and has written extensively on technology and presentations. Duncan has previously developed multiple display environments that enhance learning.

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## **About TOP-TEC**

TOP-TEC is a Birmingham-based designer and manufacturer of technical furniture solutions that combine people and technology into engaging spaces. Long-established for supplying lecterns to many UK universities and colleges, TOP-TEC has developed a range of 'Synergy' tables specifically for active learning spaces, and is developing agile learning solutions for other teaching spaces.

TOP-TEC has a Birmingham showroom and a small network of specialist audio visual resellers across the UK.

[www.top-tec.co.uk](http://www.top-tec.co.uk) t: 0121 783 3838

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TOP-TEC's Synergy tables in active use  
Team-Based Learning Room at The University of Bradford