SCALE-UP active learning

Improving outcomes for students and staff at Nottingham Trent University

Summary
Nottingham Trent University (NTU) is the first UK university to adopt an active learning approach called SCALE-UP. It stands for Student-Centred Active Learning Environment with Upside down Pedagogies and was developed by academic staff at North Carolina State University. In summary:

• SCALE-UP has been adopted by about 375 organisations over the last ten years, including a wide range of universities and also increasingly high schools (secondary schools)

• Tens of thousands of students have been taught using this approach, using active learning with carefully chosen technology enhanced learning (TEL)

• There is evidence that the SCALE-UP approach leads to improved student learning outcomes, including improved conceptual understanding and better problem-solving

• It also contributes to improved student attendance and satisfaction and lower failure rates

• NTU ran a large SCALE-UP pilot in 2013-14 with 33 module leads across a wide range of subject areas, and evaluation showed that the approach to teaching had a positive impact on student learning outcomes

• 45-50% of undergraduate courses at NTU are now taught using the SCALE-UP approach

The SCALE UP approach to active learning
SCALE-UP is typical of many active learning approaches in that it describes a way to move from didactic (talking heads) forms of teaching towards approaches where learners are more actively engaged in their own learning, using things like problem-based and enquiry-led methods. SCALE-UP is different from some approaches because it combines specific pedagogic approaches (which are quite detailed and specific) with a particular approach to room design and utilisation including particular TEL technologies. It is this combination of pedagogy and space that seems to be most powerful and gets results.

SCALE-UP is sometimes described as an alternative to lectures because it can be used for large groups of up to 100 students at one time using a more active style. Tiered lecture theatres or teaching rooms are re-fitted as flat classrooms. In a SCALE-UP session, groups of nine students work together around a circular table, using shared laptops (in groups of three) to solve problems and address questions. The room contains a combination of digital projection facilities and smart screens. Typically, students work together in small teams to solve a problem or address a question set by the teacher. They then share their conclusions with other groups by using the laptops and smart screens.

Teaching staff circulate through the room to provide support to the students, rather than using a didactic (presentational) mode. Sometimes more than one member of staff works with the group together.
Some of the types of activities that typically work well in a SCALE-UP session are:

- Activities to test or consolidate students’ comprehension of preparatory work, such as an online poll or a brief small-group discussion
- A substantial problem or investigation divided into 10-15 minute tasks
- Group activities in smaller and larger groups to summarise and present key ideas
- Online investigations into key topics
- Ten minute tutor mini-lectures to supplement group work, confirm key concepts, address misconceptions, etc
- Presentation of student work in plenary, with plenty of opportunity for questions and peer and tutor feedback
- Five minute session summaries
- Group and individual reflection on learning and group effectiveness

Any activity requiring individuals or groups to teach what they have learned to others (McNeil et al, 2017)

**Improved student experience and outcomes**

The main driver for SCALE-UP at NTU has been to improve student learning outcomes and the student experience. This had already been demonstrated through the evaluation work done by the creators of SCALE-UP, Bob Beichner and his colleagues at North Carolina State University, who found that using SCALE-UP in teaching made positive impact as follows:

- Conceptual understanding increased
- Ability to solve problems improved
- Attitudes and attendance improved
- Failure rates were significantly reduced
- “At-risk” students did better in later modules (Beichner et al, 2007)

Similar patterns have been found at NTU where SCALE-UP has been proven to improve learning and also been popular with students, though they acknowledge that it makes them work harder and forces them to engage, even when it may be easier not to. Engaged learning can be harder work. “In an evaluation of the NTU SCALE-UP pilot modules in 2013-14 (McNeil et al, 2013), teaching staff reported greater student engagement with materials and more interaction between peers and the tutor, leading to increased conceptual understanding as a result of introducing SCALE-UP.”

**Developing knowledge and skills**

There is ‘nowhere to hide’ in a SCALE-UP classroom interaction; unlike in a traditional lecture, all students are engaged fully with learning rather than passively listening. Some students love this, others do not. NTU has found that it is really important to ‘do careful work with students to help them to prepare’ for their SCALE-UP sessions so that they are able to interact fully and not feel exposed. This
focus on preparation usually leads to higher levels of student satisfaction.

“One of the strongest reasons that students give for preferring a SCALE-UP class is the ability to work and get to know each other in the class.”

(Beichner et al, 2007)

NTU has also found that it’s really important to understand the background and prior experience of the cohort of students before deciding whether to use SCALE-UP. For example, it does not work well with final year students who have no prior experience of active learning. Also, there may be cultural preferences in some groups that mean that, for example, they find the group work part of SCALE-UP to be challenging. Additional support and preparatory work may be needed in some contexts.

Overall, SCALE-UP is a more active approach to learning and teaching for large groups and so, perhaps not surprisingly, students seem to learn better and, in most cases, to enjoy the session more.

**Staff satisfaction**

For teaching staff, there has been frustration with providing traditional lectures and an awareness that they are often ineffective in supporting learning. Staff were keen to look at other ways that they could teach large groups that might be more effective.

Moving to an active learning approach can be demanding for teaching staff, particularly if they have not done this kind of teaching before, and it requires preparatory work in order to work out the best way to use the methodology and the space available.

NTU has found that using SCALE-UP to teach can be harder work for staff, but according to staff responses to evaluation, this additional effort is worthwhile because of the satisfaction that they gain from seeing how well the students learn. They observe much higher rates of quality interaction between students (peer-to-peer) and also between staff and students. Staff also report that they are able to observe more closely and in a timely way how students are learning and able to intervene in problem areas. This is also a much more effective approach than picking up on problems during summative evaluation (ie through examinations).

“The main thing with SCALE-UP is capturing how students learn, because I think years and years of evidence have shown that students do not learn the way we teach, so what we need to do is to start teaching the way they learn and that’s what SCALE-UP does.”

**Evidence builds success**

Data shows that adoption of the SCALE-UP approach to active learning has been a real success at NTU. Take-up has grown significantly every year and both students and staff are positive about the approach.

NTU committed to a serious examination of SCALE-UP through a large pilot in 2012-13 that involved re-fitting two large teaching rooms with new furniture and buying new IT / AV equipment.

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(Beichner et al, 2007)
“45-50% of undergraduate courses at NTU include one or more SCALE-UP modules”  
(McNeil et al, ibid)

Implications for other institutions
NTU has seen sustained growth and take-up of SCALE-UP over more than five years. Why has this approach worked so well when so many others do not?

Practical approaches
The nature of the SCALE-UP methodology has contributed to its successful take-up. It is a great blend of specific practical examples of space design combined with instructions on the best ways to run active learning sessions in the spaces. This level of detailed guidance makes it much easier to take up and use in practice than some other systems.

Inclusive not prescriptive
There are also some subtle factors that have encouraged teaching staff to try SCALE-UP. The educational development team decided that they would take an inclusive rather than prescriptive approach, so teaching staff are able to use SCALE-UP in ways that they are comfortable with, rather than having to follow every step of the guidance. Educational developers have worked very closely with teaching staff to help them work out the best ways to use the method, and this level of support has also been a success factor. Their default position to any question was “yes” and, particularly during the more challenging pilot phase, they pulled out all the stops to make the SCALE-UP sessions a success.

Buy-in across the university
Using SCALE-UP has had implications for many departments and processes including timetabling, and success would not have been possible without their buy-in. Timetabling processes ensure that they have access to the right type of teaching space and educational development can also get in touch with the teaching staff to ensure that they can be supported in understanding how to make best use of the learning space. This process has

 Levels of usage have increased significantly in each subsequent year since then. In 2015-16, 86 modules, involving 1,700 students, used SCALE-UP. In 2018, around 200 academics are involved in SCALE-UP teaching, supporting the learning of over 2,000 students across more than 200 modules. There are now 12 bespoke SCALE-UP rooms, which offer a range of capacities and a variety of technologies, and 45-50% of undergraduate courses at NTU include one or more SCALE-UP modules (255 undergraduate courses out of 499 - some modules are used by more than one course).

This concrete evidence gives credibility which other approaches sometimes lack. NTU is able to evidence the impact that the adoption has had in many areas and this helps to create the positive “story” around SCALE-UP that has been one of its success factors.

“The team did everything they could to support SCALE-UP sessions, from high level pedagogy to borrowing curtains!”

equipment. Thirty-three module leads signed up to pilot teaching with SCALE-UP across a wide range of disciplines, including physics, sociology and marketing. The pilot was carefully evaluated, and it was found that SCALE-UP had had a positive impact on many aspects of student learning outcomes and student experience and that it had been well-received by teaching staff.

Case study  
SCALE-UP active learning - December 2018
also created opportunities to help teaching staff who are new to SCALE-UP to engage with one of the SCALE-UP spaces and think about how they might use it in their own teaching.

The estates team has played a key role in the success of SCALE-UP so far. Active learning design assumptions for room design are now their default for the design of new learning spaces. They even provide ‘pop-up’ SCALE-UP rooms where demand outstrips supply. They are also looking to the future and thinking about how these active learning approaches can be supported in the future and the implications across the campus.

Long-term vision
An important factor in the success of the project was also a commitment to the initiative over the long term; it would have been easy to lessen some of the momentum after the first pilot year but the pressure was kept up, with lots of positive communication about the early success stories, and this has encouraged more and more people to get involved. Now that more and more people are getting involved, a new approach is needed and NTU is considering using a buddy mentoring system with ‘SCALE-UP champions’ to help include more teachers in the community.

“A active learning design is now the default approach when creating new learning spaces”

The continued focus on looking to the future and thinking about ‘what’s next?’ really helps, and NTU has been successful in receiving funding for an Office for Students’ project, working jointly with Anglia Ruskin and Bradford universities, to examine how the use of active collaborative learning approaches (like SCALE-UP) might help to correct unexplained attainment disparities.

Further information and references
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NTU SCALE-UP site: https://www4.ntu.ac.uk/adq/teachingSCALE-UP/index.html


International SCALE-UP site: http://scaleup.ncsu.edu

Beichner, R. J. et al. 2007. The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) Project. percentral.org/document/ServeFile.cfm?ID=4517


Education consultancy Sero HE was commissioned by Jisc to interview Jane McNeil, executive dean of learning and teaching, about developments in learning and teaching in a digital age at Nottingham Trent University. The studies focus in particular on the impact of such developments on the student experience.