SCALE UP: Tips and Guidance

This document provides tips and guidance in using the SCALE UP methodology based on practice at Sheffield Hallam University, practice at other institutions, and general learning and teaching research.

Motivating my students to engage in SCALE UP

Students may ask: "Why is this better than you just telling me what I need to know?"

SCALE UP creates a space for using and evaluating knowledge critically and developing a student's confidence:

- At university level, a student needs to know more than just facts or how a process works. A student needs to be able to use and critically evaluate factual and procedural knowledge confidently in different situations.

- Developing conceptual knowledge and testing their understanding of it will lead to their success at university and beyond.

- Working with other people will develop a student's self-esteem and confidence.

- SCALE UP allows a student to apply and check their knowledge using a variety of problems.

- SCALE UP is designed to develop student's learning and graduate capabilities. The types of problems and situations are similar to ways of working in life beyond university, and therefore SCALE UP provides a valuable experience both for learning and future work.

Be clear about what, why and how

Motivate your students by briefing them clearly:

- **Establish ground rules** – explain what is needed and agree what you expect of each other.

- **KISS** - keep session and activity briefings simple, practical and doable. Restate goals as necessary during the session.

- **What's the point?** - make SCALE UP learning meaningful and explain the benefits (see below). Be explicit about how the session's outcomes and activities relate to learning on their course or module and to the students' aspirations beyond the course.

- **Establish effective teams/triads** - don't just throw students in the deep end – SCALE UP will not be familiar to them. Design a small activity that involves them in agreeing a good team name, and creating a flag or logo for their team (etc.). Consider assigning team roles (Coordinator, Questioner, Scribe work well in SCALE UP) and rotating these between team members.

- **Design good problems for them to work with** - make them real, realisable, open ended, in need of discussion and problem-solving strategies (see section on designing good problems).

1

- **Connect the problem with the 'real-world' context** - if possible, bring in external people such as recent alumni and experienced practitioners to explain why the problems they are solving are important and why the understanding the process is vital for their career aspirations.

Learning benefits and outcomes of SCALE UP Problem-based Learning approach

Activities develop and provide evidence of the students' capabilities to,

- Work in teams

- Work independently

- Manage projects and hold leadership roles

- Use oral and written communication

- Evaluate group processes and develop self-awareness

- Analyse and think critically

- Explain and apply conceptual knowledge

- Self-direct learning

- Apply course content to real world examples

- Research and information literacy

- Problem solve

Active Classroom

The active classroom delivers time on task. Time on task delivers deep learning, learner fluency and confidence.

Active learning strategies for facilitators in SCALE UP

- Circulate around the room and 'drop-in' with each table frequently;
- Stay with groups long enough to acknowledge good contributions and provide useful insight;
- Use the assigned team roles to check their progress, but check that they all understand what is being learnt;
- Stand back and listen to teams and tables – you might not be needed;
- Assign the groups yourself, rather than allowing the students to work with friends

The active approach to student engagement

Questioning and discussion activities are defining parts of an active learning strategy. They,

- promote student-teacher interaction;
- signal the value of peer co-operation;
- value what students know already;
- generate feedback through collective interaction;
- value diversity in knowledge, skills and perspectives;
- set realistic challenges;
- adapt to the situation;
- promote time on task and development of confidence.

Preparing to establish the session

Think about how you will,

- arrange a suitable space that is conducive to holding a purposeful, focused discussion;
- learn or remind yourself of student names if you don't know them yet;
- gain the trust and attention of the whole class or groups within it;
- reassure students who don't want to look silly in front of their peers;
- deal with heckles and attempts at disruption;
- delimit the discussion in terms of its scope and time;
- clearly communicate the objective of the discussion, the value of the students' engagement, and the supportive and appreciative basis for discussion.

Maintaining the session

You will,

- address each student by name;

- adopt a question style that is inclusive, positive and supportive and does not imply criticism;

- capture key ideas during the discussion;

- listen intently to contributions whilst at the same time facilitating the situation;

- keep a conversation alive by being positive, yet looking for alternative possibilities;

- develop uncertainty and curiosity;

- use conversation to produce something together e.g. some principles, a process, a way of remembering important information, etc.

- move amongst the class and make eye contact with every student in the room to acknowledge their participation, even if it is silent so far;

- value contributions by connecting one good idea or question to another.

Resolving the session

Think about how you are going to,

- use key ideas captured during the discussion to form conclusions or to inform later sessions;

- note the students who have not contributed so you can talk to them informally. You will need to ask them what would encourage them to contribute and agree an expectation with them for their future participation on that basis;

- in summarising, acknowledge people who contributed points.

Managing the session

Take time to establish ground rules with a cohort - e.g. at Level 4, dedicate time to discussing and agreeing what learning involves at university and how this is different to school or other situations. Ensure the students' expectations are the right ones.

Create an 'engagement charter' – when you first meet agree through class discussion what is important for creating a successful learning environment. Publish it to the VLE for future reference.

Make attendance worthwhile - keep attendance records to clarify the importance of participating. Issue something valuable in each session e.g. hand-out, feedback, task briefings, 'heads up' to future activities, a regular pertinent news item relation to the course, subject or profession. Use case studies or scenarios for small group work, providing them with examples they can use for revision.

Highlight the importance of punctuality and lead by example! - Make the beginnings of sessions worthwhile and consistent e.g. create a regular short session icebreaker activity or challenge to bring activities into focus.

Be clear - carefully brief group activities and take questions for further clarification.

Be organised - set up the room, update and distribute hand-outs in a timely fashion to avoid undermining momentum at the outset of an activity, be aware of the time, etc.

Be realistic - do not overload sessions. Be selective about what you will cover in class. Refer to and provide links to other information for their independent use.

Be observant - monitor group conversations for confusion, pre-empt difficulties and clarify. Clarify those points with the other groups too.

Be leaderly and facilitative - address disruptions on behalf of the cohort.

Address non-participation and be inclusive – sensitively manage participation by bringing in quieter voices and challenging dominant voices. Find opportunities to encourage participation and listen to reticent students.

Be frank and direct sometimes - don't have a conversation about everything! Don't tie yourself up in knots when the simplest action may be to give information, ask what is wrong or what can be improved.

Value difference - appreciate alternative ideas and perspectives, not just those that clone what you say.

Learn from peers - keep talking with your colleagues about what is working for you and what is not working.

Designing problem-based activities

A complex real-world problem is an essential component of Problem-Based Learning (PBL) and 'content' or knowledge is introduced *through* the context of the authentic problem and its resolution. In PBL the problem is expressed in the form of a scenario and this establishes the activity with the students.

Students work in small groups. First, they must identify what they know, what they don't know and what they must learn to solve a problem.

Creating a good problem scenario

Good problem scenarios are authentic and ill-structured and require students to go beyond their textbooks to pursue deep knowledge. Well-formed scenarios feel real, containing realistic situations and settings, key players, consequences, and problem statements that require student analysis and further research.

Design good problems for the students to work with: make them real, realisable, open ended, in need of discussion and problem-solving strategies. Make it clear that real world 'problems' and discussions have multiple possible 'right' answers and that students need to work together imaginatively. Learning happens by *working out* solutions, not by having the right solution.

> "PBL is a student-centered, inquiry-based instructional model in which learners engage with an authentic, ill-structured problem that requires further research (Jonassen & Hung, 2008). Students identify gaps in their knowledge, conduct research, and apply their learning to develop solutions and present their findings (Barrows, 1996). Through collaboration and inquiry, students can cultivate problem solving (Norman & Schmidt, 1992), metacognitive skills (Gijbels et al., 2005), engagement in learning (Dochy et al., 2003), and intrinsic motivation."
>
> (http://www.facultyfocus.com/articles/instructional-design/problem-based-learning-six-steps-to-design-implement-and-assess/)

In SCALE UP, problems can be small puzzles that form the basis of meaningful activities in which problem statements can be discussed and resolved. Such small activities can help groups and individuals identify knowledge gaps and strengths. From this, they can develop strategies for developing their knowledge and skills.

Six Steps to designing a problem-based approach

Step One: Identify intended learning outcomes - answer, what will your student know and be able to do?

Step Two: Design the Scenario - design a scenario with an embedded problem that is a real, complex issue related to your course content. Scenarios should be motivating, interesting, and generate good

discussion. Create a scenario that will challenge different types of thinking, and elicit discussion, research, and learning that needs to take place to meet the learning outcomes.

Step Three: Introduce PBL - PBL is likely to be new to your students. Explain it and develop their confidence by allowing them to practice with an "easy problem,"

Step Four: Research and enquiry - PBL research begins with small-group brainstorming sessions in which students:

- Examine, clarify and define the problem;
- Explore what they already know about the problem;
- identify what they don't know yet and what they need to learn more about (topics to research);
- Determine what they need to learn and where they can find and acquire the information and tools necessary to solve the problem.
- Evaluate possible ways to solve the problem.
- Solve the problem.

Groups should,
- write the problem as a statement or research question;
- use group roles and assign responsibility for researching topics necessary for them to fully understand their problems;
- develop an initial hypothesis to "test" as they research a solution and revise this as necessary.

Step Five: Product Performance - using their knowledge and research data, the students should create products and presentations.

Step Six: Evaluation - in SCALE UP the students, or peer groups, should evaluate their products or performances. Rubrics can be used to support this and to aid group reflection on what they have done. It may be more productive to start with groups just presenting to the others on their table and build towards having them present back to the whole room.

Why use problem-based learning?
Nilson (2010, p. 190) lists learning outcomes associated with PBL. A well-design PBL project provides students with the opportunity to develop skills related to:

- Working in teams.
- Managing projects and holding leadership roles.
- Oral and written communication.
- Self-awareness and evaluation of group processes.
- Working independently.

- Critical thinking and analysis.

- Explaining concepts.

- Self-directed learning.

- Applying course content to real world examples.

- Researching and information literacy.

- Problem solving across disciplines.

Engaging students in pre-class activities

This is about 'flipped learning' and the use of diagnostic activities (self-assessed pre-class or assessed at the start of class through voting) to check engagement.
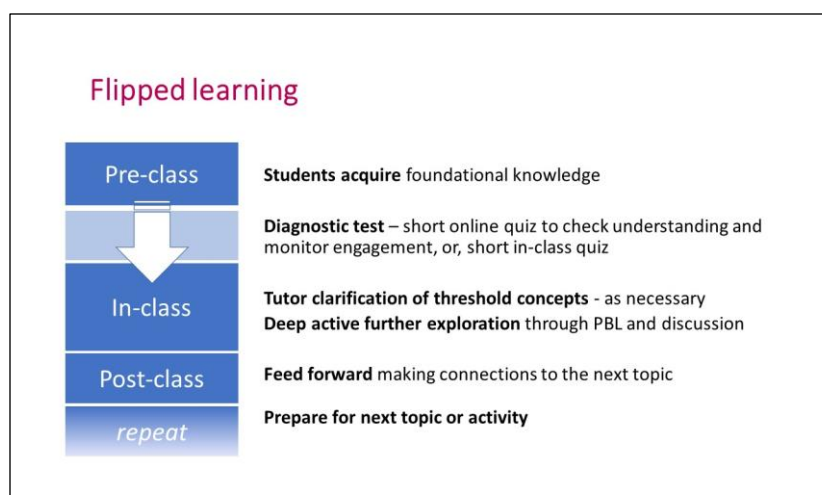
Flipped design is often associated with the use of pre-class video. Video can be a very rich and engaging resource, but it is not the only way by any means, of engaging students in pre-class learning. Long explanatory videos tend *not* to be engaging to the viewer.

Instead, think about how *best* to engage your students before class. Be realistic about what they can learn factually or conceptually on their own, especially at Level 4. Think in terms of building engagement and factual knowledge, key processes or concepts. Create a foundation for deeper exploration in-class. Ensure that the connection between pre-class and in-class activities is clear.

In pre-class activities, your aim is to bring the whole class up to speed with key foundational knowledge which they can develop in class. You can use any media or methods to achieve this.

Diagnostic

Flipped learning falls down when students do not engage before class. The use of diagnostic testing, especially if it is run as a small multiple choice test online *before* class, allows the lecturer to monitor engagement in the pre-class work. Checking what students have learnt from pre-class activities also informs whether the lecturer needs to clarify any misconceptions.

If it is not possible to do an online pre-test, then flipped classes should begin with a brief diagnostic activity. 'Clickers' or app-based tools like Socrative or Nearpod can be used to do this, or even non-digital Socratic questioning.

Brief explanations can be given top clear up misconceptions, or group-based activities can be designed to develop, apply, interrogate and check knowledge. The lecturer has a facilitation role in class and works alongside student groups, listening and making interventions in group discussion or activities as necessary.

Think about whether creating a leaderboard to show students their relative standing in diagnostic exercises would motivate them to take part. This needs to be considered carefully, as some students will be demotivated by it.

Using defined student roles in group activities

All students should be continuously engaged working collaboratively to solve problems and contribute to discussions. However, the assignment of roles helps to commit students to time on task.

Why use roles in group work?

- Helps focus students on the task;
- Assigning roles sets expectations for student engagement and clarifies how they need to contribute and take responsibility;
- Helps prevent one student sitting back and allowing the others to do the work - e.g. if the scribe isn't doing their job then nothing is being recorded.
- Develops team-working and interpersonal skills (must rotate roles per activity or session)
- Prevents arguments about who will make notes;
- Ensures that assumptions are questioned.

The Manager,

- Directs the sequence of steps in the problem;
- Manages time;
- Reinforces the merits of everyone's ideas;
- Ensures that each group member participates.

The Scribe,

- Writes actual steps on the whiteboard or constructs the group presentation;
- Ensures that each group member understands what is being learnt in the activity as it progresses;
- Makes sure all group members agree on each step of the problem.

The Questioner,

- Makes sure all possible problem-solving strategies are explored e.g. encourages group members to think of alternative strategies;
- Scrutinises proposed actions, raises any concerns and suggests alternative approaches;
- Provides reasoning and explanations of steps to group members as necessary.

Beichner and his colleagues recommend scheduling some brief training in group functioning early in the module (Beichner *et al.* 2007). Regular, structured reflection on group roles and functioning is also vital. It is useful to devote some class time to this or to set follow-up tasks where students reflect then produce an action plan for further development. This kind of reflection supports not only students' development of effective group work skills but also their self-efficacy. Furthermore, reflection on group functioning

following carefully selected prompts can allow students to give and receive constructive feedback, a valuable skill in itself.

How do students learn the 'content' in SCALE UP?

Content can be understood as methods, knowledge and outcomes, or simply as just knowledge.

Foundational knowledge is,

- Discovered during pre-class activities;
- Checked in (self) diagnostic activities;
- Deepened in class through problem-based scenarios;

SCALE UP methods allow students to solve problems by using their knowledge, identifying knowledge gaps, and by forming, testing and developing hypotheses.

Knowledge and skills are developed through enquiries in response to groups identifying knowledge gaps. Such methods allow students to develop deep knowledge as well as confidence in using processes that they can apply to similar problems.

Adapting my practice to SCALE UP rooms

- Devise suitable problems and scenarios for the students to work on - ideally, these should reflect 'real-world' problems

- Where necessary, develop pre-session resources to get across the core knowledge needed to work on the problem. Consider using a quiz for students to check that they have understood the material.

- Start with sessions that contain several small problems and activities interspersed with reporting-back and content from you.

- Then build towards using fewer, larger and more complex problems and enquiries and encouraging students to design their own problem activities to demonstrate their confidence and understanding.

References

Beichner, R. J., Saul, M., Abbott, D., Morse, J. J., Deardorff, D. L., Allain, R. J., Bonham, S. W., Dancy, M. H. and Risley, J. S., 2007. The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALEUP) Project. *Research-Based Reform of University Physics.* [Online]. Available at: http://www.compadre.org/per/items/detail.cfm?ID=4517

Nilson, L.B. (2010) *Teaching at its best: A research-based resource for college instructors.* 3rd edn. San Francisco, CA: Wiley, John & Sons.

27/01/2017, Learning Spaces Toolkit, Teaching Essentials produced by LEAD, Sheffield Hallam University