

Background on the SCALE-UP Format

SCALE-UP (Student-Centered Activities for Large Enrollment Undergraduate Programs) originated at North Carolina State University in the Physics Education Research and Development Group.

The SCALE-UP format has these essential components:

- Mini-lectures, which replace full period lectures.
- High engagement learning activities: discovery learning, inquiry-based learning, and cooperative learning
- Student tables that provide power and network for student laptops or tablets (typically seven foot round tables seating three teams of three).
- Formative assessment by the instructor and one or more learning assistants during the learning activities.
- Rich social interactions that develop a community of learners.

In a student-centered course, students take responsibility for mastery of the learning objectives. If the supporting material for a learning objective is not “written on the board” students are still responsible for mastery. It is an axiom of the SCALE-UP format that mastery is often better supported by activities other than lecture.

In the traditional mode of instruction, each class period is devoted to lecture with questions occasionally asked by students or instructor. Research shows that the attention span for lectures is on the order of 12 minutes so it is not surprising that outside of class students struggle to interpret their class notes and to solve the assigned problems.

In an active learning mode of instruction, the lecture is interspersed with activities which can be quite varied. For example, in think-pair-share students are given a minute or two to think about a problem, then they turn to their neighbor and share. Electronic student response systems can be used to collect and display student thinking. A one minute essay can be used at any time within a class period.

SCALE-UP is a specialized active learning format. The key to scale-up is the social interaction among students, instructor, and learning assistants. The instructor and learning assistants formatively assess student learning by listening to student conversations and by watching students work. They serve as facilitators of guided inquiry by asking students leading questions when they get stuck. The instructor no longer has to wait until the first exam to determine “who is getting it.” Formative assessment informs instruction. Traditionally, students solve sets of problems for homework and this work is often done alone. A SCALE-UP course brings problem solving into the classroom.

The SCALE-UP format is currently used at Clemson in the General Engineering program (all sections of the first year courses), Math Sciences (all sections of calculus I and II, and a section of calculus III), Civil Engineering (one section of engineering statics), Mechanical Engineering (all sections of engineering statics and dynamics), Horticulture, Nursing, English, and Computer Science.