I share experiences in teaching College Physics I at the University of Central Florida in a standard classroom environment with 100 – 300 students as well as in a studio environment with 100 students. I discuss some feedback from the students, my perceptions of the pros and the cons, and how the experiences from the studio setup can be implemented more efficiently in a standard pedagogy environment with limited resources.
Background

I have taught College Physics I in standard classroom setting with 100 and 300 students, and more recently in a studio environment with 100 students. I share the pros and the cons of these two methods, feedback from the students, and grade distribution.
Standard pedagogy

I use two projectors. (i) One for projecting the PowerPoint slides and (ii) the second one is a write on tablet which I use to explain things, solving problems, reminders, etc. This tablet is the essential and indispensable component of my teaching, - not the PowerPoint slides, which are used to show pictures, diagrams, problems with figures etc. Examples are shown in the figure below.
Problem 55: chapter 10
The sled shown in the figure starts from the top of a frictionless hill and slides down into the valley. What initial speed does the sled need to just make it over the next hill?

\[ \frac{1}{2} m v_i^2 + m g h_i = \frac{1}{2} m v_f^2 + m g h_f \]

\[ v_f = 0 \]

\[ \frac{1}{2} v_i^2 + g h_i = g h_f \]

\[ v_i = \sqrt{2 g (h_f - h_i)} \]

\[ v_i = \sqrt{2 \times 9.8 \times (42 - 30)} \text{ m/s} \]

\[ v_i = 15.3 \text{ m/s} \]

Chapter 9: Problem 15
A 3.3 kg block of wood sits on a table. A 3.0 g bullet, fired horizontally at a speed of 470 m/s, goes completely through the block, emerging at a speed of 240 m/s.

What is the speed of the block immediately after the bullet exits?

Problem 9.15
(Apply conservation of momentum)

\[ m = 3.0 \text{ g} \]
\[ v_i = 470 \text{ m/s} \]
\[ v_f = 0 \]

\[ \frac{M=3.3 \text{ kg}}{m=3.0 \text{ g}} \]

Before collision

\[ P_i = m v_i + M v_i \]

\[ =(0.003 \text{ kg}) \times \frac{470}{3} + 3.3 \times \phi \]

\[ = 1.41 \text{ kg m/s} \]

After collision

\[ \phi = \frac{0.72 \text{ kg m/s} + (3.3 \text{ kg}) v_f}{3.3 \text{ kg}} \]

\[ v_f = \frac{(1.41 - 0.72) 3}{3.3} = \frac{0.207}{3} \text{ m/s} \]
Course components

- Quiz almost every week
- WebAssign Homework
- Three Tests
- I-clicker
- Comprehensive Final
- Recitation – Pre-Lab and Post-Lab
- Laboratory (10 projects)
Studio Environment

- UCF-Physics studio setup: 11 round tables, each with 3 desktops, each desktop shared by 3 students – a total 99 students
- 2 hrs 30 minutes twice a week integrated lecture and lab environment
- Online MasteringPhysics homework (similar to standard setup)
- Online MasteringPhysics Group Activity: to be discussed in the class and submitted, group credit.
- Hands on Group Projects (one from each table) and presentation
- Data capture and analysis using Logger-Pro
- Lecture: lot less compared to standard pedagogy
- Write-on-Tablet is used for discussion and problem solving.
- The big difference is discussion and problem solving is done after students have tried on their own.
Students are engaged in group activities. In the picture the GTA Aiqun Huang is discussing problem 14.19 projected in the main screen.
Grade Distribution

Fall 2011 – standard classroom pedagogy
Fall 2012 – SCALEUP pedagogy
Fall 2013 – SCALEUP pedagogy with more weight for group activities
Discussion & Conclusion

- SCALEUP environment with integrated lecture and hands-on activities for 5 hours per week offer better platform for learning for each other and from the GTA, LA, and the instructor.
- The traditional method with the recitation, pre-lab and post-lab components can offer some features of SCALEUP and comparable learning environment.
- Many student do not like the “less-lecturing” part of SCALEUP.
- In the traditional environment a good lecturer can influence students in a very positive way.
- Group activities in ScaleUP setting may inflate the grade.
- My student evaluations and comments are better in a traditional classroom setting.
- There are issues in the group activity of “equal” contribution.