Flipping an Introductory Physics for Life Sciences Course

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**Current Flipped Structure**

**Why a Flipped Classroom Structure?**

### Working in collaborative small groups
- Social Learning Experiences
- Cooperative Learning

### Discussing concepts and problems with peers and instructors
- Peer Instruction
- Cognitive Modeling
- Verbalization: Self-explanation

### Working on problems repeatedly over time
- Distributed Practice
- Self-regulation

### Reflect on your own learning
- Metacognition
- Self-regulation

### Immediate feedback on workbook and online homework
- Feedback

### Watching problem solving in videos and in class
- Cognitive modeling of academic skills

### Reading text, listening to video lectures, writing problem solutions, talking to peers and instructors
- Varying Instructional Modes
- Multiple Intelligences (Talents)

### Written and verbal explanations of conceptual understanding
- Verbalization: Self-explanation

### Recent studies showed improved course grades
- Self-explanation
- Small-group discussions
- Student accountability
- Interactive class activities

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**Student Experiences and Evaluation Comments**

- Loved it as a disability student. I got the attention I needed.
- I am now NOT afraid of physics.
- It was miserable...overall I feel dumber. I hate the format with the hatred of all the demons in ??***.
- I thought the course was excellent and properly prepared.
- If it were a different subject, the flipped classroom would be good, but physics is difficult and the teaching should be done in class.

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**IPLS at John Carroll**

- Majority are biology and pre-med sophomores and juniors
- 2-sections of 32 students each, fall and spring
- 50 min lecture course, 3 times a week
- Co-requisite: 2-hour per week lab course

**Before class**

- Watch annotated power point lecture video, take notes, avg 1-hr per chapter
- Online Reading Questions, about 5 per chapter
- Read Textbook

**In class**

- Ask questions about the recorded lecture or reading questions
- Work in collaborative small groups on workbook or homework problems, 2-3 students per group, self-selected

**After class**

- Finish online homework and workbook problems

**Teaching Assistants**

- One undergraduate physics major per lecture section
- Assists with student questions during class and holds weekly tutoring sessions

**Course Materials**

- College Physics Workbook for Students
- Mastering Physics online homework system

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- 59% had no prior experience in a flipped classroom.
- Overall experience first semester: 48% negative, 24% neutral, 26% positive
- On average, students found the textbook to be somewhat useful, the video lectures useful, and mastering physics homework very useful
- What to keep: 28% mastering physics homework, 20% group work, 13% structure
- What to change: 31% more in class examples, 22% more lecture, 19% structure