Flipping algebra-based Physics 1

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Survey

Thinking of what you want to get out of your college education and this course, which of the following is most important to you?

a) Acquiring information (facts, principles, concepts).
b) Learning how to use information in new situations.
c) Developing lifelong learning skills.
All three goals are clearly important. Let us think of how to accomplish these goals. *Learning takes work*: that includes work done in the classroom and work done outside of the classroom (your own reading and studying).

Of these three goals, which do you think would be **best achieved in class** working *with your classmates and me*?

a) Acquiring information (facts, principles, concepts).
b) Learning how to use information in new situations.
c) Developing lifelong learning skills.
Flipped classroom

First day of class

1. Watch **recorded lectures**, answer **online** questions
2. Do **in-class activities**
3. Do **online** homework
4. Take in-class assessments (as in traditional course)
What are the benefits of ‘flipping’?

Outside of classroom

- You may **replay, pause, rewind, forward** lectures!
- You may easily avoid “cognitive overload”
- You may **monitor yourself** at your own pace.

In classroom

- You do **active learning** for **entire in-class time**.
- You receive immediate **feedback from instructor**.
- You more frequently **interact with classmates**.
Why should a flipped classroom work?

- **Learning is active**: you only learn by doing – not by watching others do.

- **Feedback** and **coaching** are essential for learners.

- **Engagement** makes in-class periods more pleasant and productive.
Supporting evidence

Histogram of test scores

- **ave 41 ± 1 %** for lecture
- **74 ± 1 %** for experiment

Image courtesy of Carl Wieman, Stanford University
Learning goals

1. Apply Physics principles in real life situations
Learning goals

2. Develop problem solving skills

“As soon as we solve one problem, another one appears. So let’s keep this problem going for as long as we can!”
Learning goals

3. Connect Physics with other disciplines
Something about you

Which of these topics is closest to your personal interests (please choose one)?

a) Human body (medicine, health care, sports)
b) Human psyche (psychology, neuroscience)
c) Human communication (language, art, media)
d) Organisms (biology, microbiology, ecology)
e) Nature (chemistry, earth science)
f) Economics/Business/Finance
What you have to do to to succeed

- watch assigned video lectures before class
- **self-assess** understanding before and after class
- **be active** in class (observe, think, explain, discuss)
- seek help in a timely fashion whenever needed – office hours, tutoring sessions, Physics Resource Room (312 Thaw)
- comply with academic integrity guidelines
What I will do to help you succeed

- illustrate physics concepts in real life situations
- explain concepts through practical demonstrations
- involve you in discussions and group activities
- give constant feedback and guidance
- set clear expectations for assessment
- be accessible outside the classroom

“Tell me and I forget. Teach me and I remember. Involve me and I learn.”
(Benjamin Franklin)
In-class activities

- Concept review (clickers) questions
- Interactive demonstration (pause and predict)
- Additional examples/discussion
- Group work (with instructor feedback)
Post-class activities

- *Self-diagnostic* tools *(on homework platform)*
- *Cooperative problem solving* *(recitation)*
- *Homework* *(one scaffolded problem per set)*
- *Computer explorations* *(one per module)*
Assessments

- Concept inventories
- Attitude and beliefs survey
- Exam scores
- Student feedback (through focus groups)