Flipped Classroom Example
Sandi Connelly, Gosnell School of Life Sciences

Course: General Biology I Lecture
Class size: 100 / section (4 sections) [in the past 200 / section in 2 sections]
Student demographic: General Education, open to all majors at RIT

- Overarching goal/learning outcome/topic for this part of the course
  - Compare major organ systems, structures, and functions in animals (CLO)

- Goal for this example involving the flipped model
  - Have the students apply their knowledge of the circulatory system (blood components) to a disease.

- The out-of-class video or other "content" (ideally a link to the content, but could also be a simple written description)
  - Time goal = 30 minutes
    - http://www.youtube.com/watch?v=KSbbDnbSEyM
      - Rap video discussing the circulatory system in general
      - Note: A light-hearted intro to the topic is always a welcome lead in.
      - < 3 minutes
      - Khan Academy video – blood cells and components
      - Note: You may need a Khan Academy account to view this, as the YouTube version does not have the settings option for the captions.
      - 11 minutes
    - http://www.youtube.com/watch?v=0AyB0eYt51I
      - Video discussing what myelodysplastic syndrome (MDS) is, it’s symptoms, and treatments.
      - Note: I have the students look at this video without sound, as the notes that they need are on the slides.
      - 9 minutes
    - http://www.youtube.com/watch?v=PlFhC1egESI
      - Note: Surgical content showing a bone marrow harvest. Bone marrow transplant is a common treatment for MDS patients.
      - 8 minutes
• **Description of in-class activities**

  o Students are given the following diagram to consider (from their textbook):

  ![Diagram of blood cell development](image)

  - Lymphoid stem cells
  - Myeloid stem cells
  - Erythrocytes
  - Monocytes
  - Neutrophils
  - Platelets
  - Lymphocytes
  - Basophils
  - Eosinophils
  - Multipotent stem cells (in bone marrow)

  o The students get in to groups and discuss the following questions that are presented on the display in class. These questions are answered in the student’s notes.

    - What is the function of a multipotent cell?
    - What is the function of a myeloid cell?
    - How do these two cell types differ?
    - If leukemia is a cancer of the white blood cells, which cells *could* be involved in causing this cancer form to develop?

  o The students change groups and discuss the following questions that are presented on the display in class. These questions are answered on the worksheet below.

    - What symptoms do you think an individual would present with who is then diagnosed with myelodysplastic syndrome (MDS)?
    - What treatments would you propose?

  o These questions are discussed in class. The students are selected to contribute (occasionally with names randomly drawn from a “hat”), therefore the discussion is not always driven by the same 5% (or less) of the class.

    - Why would you propose the treatment(s) that you did?
    - What effect will these treatments have on the individual?
    - What effect will these treatments have on the disease (hint: cure or treatment of symptoms only.?)?
- **Brief summary of expected and, if available, actual results**
  
  The students who have done the work outside of class and watched the videos have no problem with the group work associated with this exercise. Those who have not, do a lot of guessing! However, in the age of technology, a quick web search will get them most of the information, but it will not easily give them the discussion question answers. They will need to apply a lot of information to get all that is needed for those conversations.