BLOSSOMS

Blended Learning Open Source Science or Math Studies

http://blossoms.mit.edu

What is BLOSSOMS

BLOSSOMS is an MIT initiative to produce a free, online repository of blended- learning video modules, each designed for presentation in a one-class session, created by gifted volunteer teachers from around the world, with the objective of developing deeper and richer skills in students, enhancing critical-thinking skills, and encouraging science, math and engineering careers.

BLOSSOMS Pedagogy

MIT BLOSSOMS has adopted a **Blended Learning Educational Approach**. This approach aims to enhance the teaching of certain lessons by the lively video presence of a gifted "guest lecturer." Students in the classroom watch a segment of a BLOSSOMS video, no segment lasting longer than about 4 minutes. Then after each segment, the in-class teacher guides or facilitates the students through an active learning exercise provided by the guest lecturer that builds from the video segment. After the learning objective is accomplished, the video is turned on again for another short segment. This iterative process continues until the exercise is over, usually lasting a full class session of approximately 50 minutes.

BLOSSOMS in different flavors:

The BLOSSOMS video lessons are as varied as are the disciplines and applications of mathematics and science experienced in high school education. A lesson could build from mandated content in one of several directions, hopefully in exciting and mind-expanding ways that actively engage students in practical, real-world problems of interest to them

The major objectives of each math or science video module are to:

- Offer a different and exciting perspective on or mind-expanding approach to a topic;

- Teach abstract concepts through the joining of observation, experience and discussion;
- Stimulate the development of critical, creative and lateral or associative thinking skills;
- Generate interest and spark imaginations regarding a subject perhaps previously thought to be dry and abstract.

In addition, having video module producers from different cultures will provide diverse flavors for each module.

Types of BLOSSOMS Modules

BLOSSOMS video lessons can take many different forms. Three possible types of modules are described below:

1- Expanding Theory: One could imagine a blended learning video module that explores some of the Pythagorean Theorem web sites and then asks the students to report on a proof not yet covered in the textbook. Such a module would expand a student's mathematical abilities and understanding of a core concept.

2- Application to the Student's World: Another type of module could explore the real-world application of a new concept. An example again using the Pythagorean Theorem would be an application in surveying, in navigation or in estimating the height of a tall tree or building. Or, it could be a demonstration of the use of the Pythagorean Theorem in architectural design, say of buildings or bridges. Or, it could even be a demonstration by an animation specialist of how geometrical principals, including the Pythagorean Theorem, are central to the art and science of animation.

3- Group Projects: Yet another type of module may present a project building from one or more recent concepts taught in class, and then ask the students to work in teams over the next week or so and present to the class the results of their project. Perhaps there would be a follow-up blended learning module to accompany the follow-up presentations. This type of module expands the classroom experience in two significant ways:

1. It enables a student to see how high school education can have broad applications in the real world
2. It extends the reach of a teacher to more creative classroom presentations and critical discussions.

In the BLOSSOMS Video Lesson Repository there are other problem situations drawn from various real-life areas such as urban living (e.g., car traffic, shopping, mail delivery, energy consumption) -- problems that can be framed and formulated and solved with the knowledge that the students are acquiring in their high school classes.

Protocols for Creating a BLOSSOMS Interactive Video Lesson

As you begin to create a BLOSSOMS interactive video lesson, it is important to realize that ***this will not be a lecture.*** Instead, it will be a 50-minute lesson divided into segments, each preferably 3 and no more than 4 minutes long. Think of yourself as doing a 'teaching duet" with the regular in-class teacher, in front of that teacher's regular class. The in-class teacher is just as important to the success of the learning experience as you are. She or he will be guided by your suggestions for what to do during the planned breaks in your video.

1) **<u>Step 1</u>, The "Concept": The concept for a video module lesson is written up in a one-page document that is submitted to Professor Larson for approval (or to a designated BLOSSOMS partner).**

- The goal is to interest and excite students about the study of math, science and engineering and about the relevance of those subjects to their own lives and to their choice of professions.
- ***The module concept should NOT be a math, science or engineering lesson in the traditional style taught in a usual high school textbook or curriculum.***
- Rather, the lesson should involve a new way of looking at, or a new application of, concepts or material that relate to subjects studied in high school.
- One approach would be to demonstrate real world applications of math, science and engineering topics so students can relate those topics to their own lives.
- Another approach would be to extend the theory studied in high school to the next level in an engaging and challenging way.
- ***The module lesson must involve integrated in-class discussions and hands-on activities that high school students can do in their own classrooms.***

- Supplies necessary for students to do the module lesson should be simple and easily accessible by all students, including those in poor, rural areas.

2) **<u>Step 2</u>, "The Architecture": Now it is necessary to map out the structure and content of your lesson before videotaping it.**

- Most BLOSSOMS video lessons should be geared to the "average" high school math, science and engineering teacher and student, rather than to the "advanced" teacher and student. "Challenge' questions can be included after a segment or at the end of the lesson for those high school teachers and students who may want them.
- The lesson should be broken down into alternating segments, including first a segment with the "visiting teacher," followed by a time to turn off the video, allowing for in-class discussion and hands-on activities by the classroom teacher and students.
- ***Each video segment of the "guest teacher" should be about 3 minutes and should never exceed 4 minutes.***
- A BLOSSOMS lesson should be made up of approximately half the time spent in segments by the "guest teacher" and the other half spent in class discussions and hands-on activities. For example, if a class session is 50 minutes long, then at most 25 minutes of that time would be the taped segment of the "guest teacher."
- ***In planning the structure and content of a video lesson, the following two steps are critical:***

  1) One must think of an exciting and compelling way to begin the lesson in order to immediately draw the students (and the teacher) into the lesson. For example, this could involve a confounding question or an astounding fact related to the topic of the module lesson!

  2) One needs to plan out carefully the discussion topics or hands-on activities that will be utilized by the in-class teacher between lesson segments in order to engage the students.

- As you plan the presentation of lesson content in a sequence of short segments, try to imagine the type of setting that would be most effective and interesting for each segment. ***With video cameras, there is no reason why the entire lesson needs to be taped in a classroom!***
- Similarly, we encourage you to "liven up" your presentation with the inclusion of relevant images available on open source image sites. (See attached document)

3) **<u>Step 3</u>, Preparing the "Pseudo-Script": It is time to write up a "pseudo-script" of how the module lesson will be presented when taped.**

- This is probably the most time-consuming part of module creation/production, but is very important if the lesson is to be presented clearly and the videotaping is to go smoothly.
- It is not expected that one will read the script during taping (thus the term, "pseudo-script), but one will be able to utilize it as a guide.
- ***It is critically important to plan and prepare a short (4 minutes or less) and exciting/engaging introduction for the module lesson. (See above)***
- It is also important to plan out how you will transition from each segment into the classroom break – where problems will be discussed and activities completed. Similarly, it is important to plan out how you will transition from the classroom break back to the next video segment.
- All illustrations, graphs, hand-outs, etc. used in the lesson should be made available in PDF form on the BLOSSOMS website for teachers to print and distribute.
- Each lesson will have a final video segment called the "Teacher's Guide Segment." Here the "guest teacher" speaks solely and directly to the in-class teacher. This segment should not run more than 10 minutes. Material covered in this segment will include:

    - ✓ The overall learning goals and objectives of the video lesson.
    - ✓ Any prerequisite topics required for students in order to utilize the module lesson.
    - ✓ A brief review, section by section, of suggested discussion topics and hands-on activities for the teacher to use in-class between the video segments.
    - ✓ Suggested "challenge" discussion topics and activities for more advanced high school classes.

4) **<u>Step 4:</u> Do the Videotaping!** Now you go to a classroom, a studio, a laboratory or otherwise on-scene – perhaps outside at some compelling location, to do the videotaping of the module. You will find that one or more of the segments require 'retakes,' as it is common to make errors when presenting the lesson. This is natural and expected. Once the videotaping is completed, you will be asked to examine the edited completed tape, for your approval or corrections.

5) **<u>Step 5:</u> Write a Teacher's Guide.** A short, one-to-two page written Teacher's Guide must accompany each BLOSSOMS video module. This will be included on the web page of your video lesson and will enable a teacher to determine quickly if your lesson is appropriate for her class. The written guide should include:
   - A quick over view of the concept and topic of the module lesson.
   - Any required prerequisites for the lesson.
   - A list of supplies required in using the lesson.
   - The minimal time required for completion of the lesson.
   - A sampling of the types of discussion topics and hands-on activities suggested for the in-class breaks.

6) **<u>Step 6</u>: Review and Approve the Transcript.** There will be a complete written transcript of the module to facilitate translation into other languages. Professionals prepare this transcript. We only ask the guest lecturer to proofread and correct the transcript.

7) **<u>Step 7:</u> Provide Information to Be Included on the Web Page of Your Video Lesson:**
   - The title of your lesson
   - Your name and affiliation
   - 2 or 3 sentences about you, including a web page if you have one.
   - A short summary of the video lesson including: the topic; the learning objectives; any prerequisites; examples of what students will do during the in-class video breaks; how long it will take; and any supplies needed for the lesson.
   - Word and/or PDF versions of any charts, graphs, images or hand-outs used in the lesson.

8) **<u>Step 8:</u> The 6 Most Important Points of these Protocols**
   1) A BLOSSOMS lesson is not a lecture.
   2) A BLOSSOMS lesson presents a topic from an unusual, interesting angle.
   3) The video segments should be 3 minutes or less, and never more than 4.
   4) The first segment needs to excite the interest of both teachers and students.

5) With video technology, segments can be filmed in interesting locations.
6) A lesson must provide challenging, thought-provoking classroom activities for the video breaks.