Enhancing Student Participation in a Biology Class by Flipping Instruction

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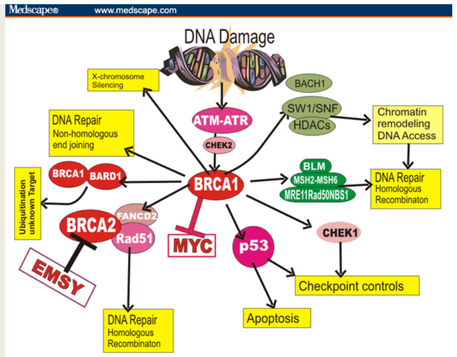
Introduction:

BSC 329, Human Molecular Genetics, is a three credit senior level elective course emphasizing current research. Although demanding, it is one of our most popular senior undergraduate courses, with 30 students enrolled in Fall 2013. I have taught my advanced genetics course in a blended format for three years . Twenty online content modules are substituted for one class session each week.

Problems with the traditional format:

- Diverse levels of prior student knowledge.
- Too much lecture needed to provide content.
- Complex course content unsuited for quick coverage.
- Too much instructor- and not enough student-directed learning.



Not a figure that works well in lecture.

New Topic

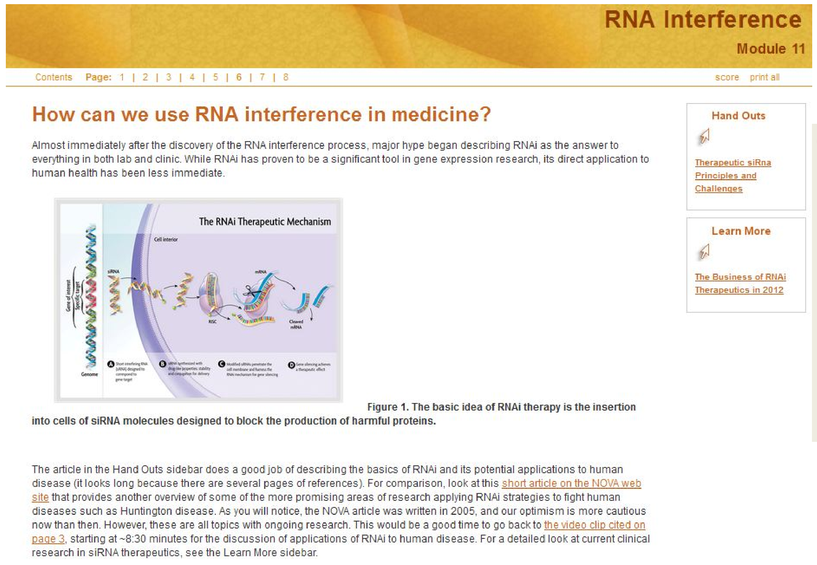
1. Presentation of case study

2. Self-paced content module

3. In-class activities

What do we do in class?

- Discussions of papers and questions introduced in modules.
- Modeling activities.
- Group work on major projects such as wikis.
- Occasional 10-15 lectures focused on applications.



What's in the Modules?

- All basic content and review materials, illustrated with figures, videos, links and articles.
- Self-tests and discussion questions.

In place of traditional exams, students create blogs.

At the end of each course unit, students write a blog entry describing what they felt that they had learned and their thoughts about the material.

Positives for instructor:

- High class attendance and participation in class activities.
- Significantly fewer student complaints about 'homework' and lack of group time.
- Easy to identify problem areas before class.

Positives for students:

- Self-paced learning and review material only as needed.
- Discussion questions introduced before class.
- Time for 1:1 interaction with instructor.
- No Friday afternoon class required (open lab with online module instead).

Conclusions

The flipped course format allows the instructor to incorporate the best features of face-to-face and online strategies to provide students with opportunities for self-paced learning and a deeper content understanding compared to classroom-only instruction. Blog entries indicate that most students gained a significantly better understanding of several difficult topics than previous students demonstrated on in-class exams.

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