

Simple but Powerful Tools for Enhancing College Science Education



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The Problem...

- There is a direct positive relationship between good student-teacher contact and academic success
 - Questions, tutoring, discussion of course/subject material
 - Role models, mentoring, inspiration, motivation
 - Personal connections = personal investment
- Unfortunately, CUNY colleges have many factors that make student-teacher interactions difficult to establish and maintain
 - Commuter schools
 - High teaching load of professors
 - Financial demographics of our students
 - Cultural differences between our students and our professors
 - Cultural demographics of our students, *per se*

The idea for using IM

- New professor at CUNY
 - Flabbergasted... *NO ONE* comes to office hours, asks questions by email, etc.!
- Placed Notes on student exams requesting meeting.
 - Nothing.
- A sound heard in class...



The Setup

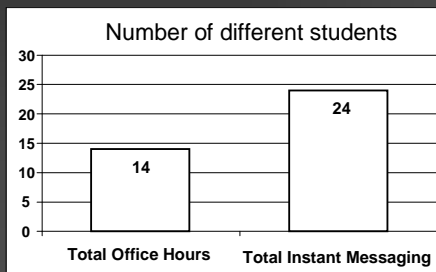
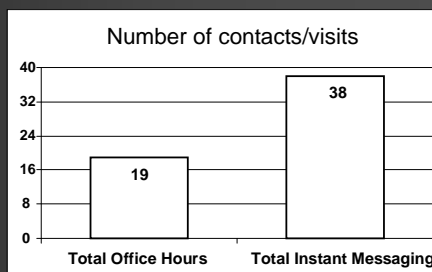
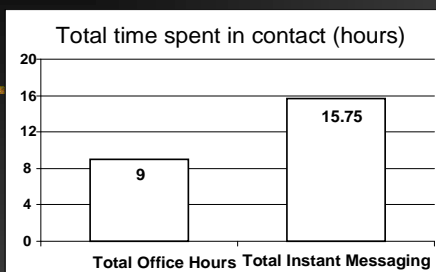
- Halfway through the course, the professor announced that he will be available during office hours (and periodically other times) on AOL Instant Messenger.
- Screenname: JJDrLents
- Student-teacher contact was carefully monitored, both on IM and in-person (office hours)
- Courses – Biology 101 and Biology 103 (General Biology)

Data

	Office Hours (before IM)	Instant Messaging
Total time spent in contact (h)	1.75	15.75
Number of contacts/visits	5	38
Number of unique students	4	24
Average time per visit (m)	21.0	24.9

Cifuentes OE and Lents NH, revisions pending, Electronic Journal of Science Education

Data



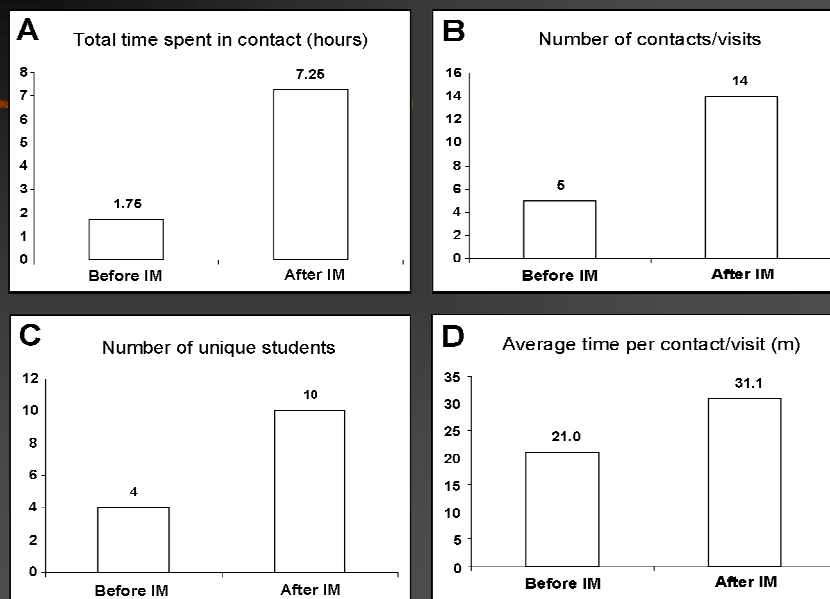
Lents NH and Cifuentes OE, revisions pending, Electronic Journal of Science Education

Data

	Office Hours (before IM)	Instant Messaging	Office hours (after IM)
Total time spent in contact (h)	1.75	15.75	7.25
Number of contacts/visits	5	38	14
Number of unique students	4	24	10
Average time per visit (m)	21.0	24.9	31.1

Lents NH and Cifuentes OE, revisions pending, *Electronic Journal of Science Education*

Data



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Conclusions: Lessons Learned

- Instant Messaging (IM) is a powerfully effective means to increase student-teacher contacts
- IM breaks down barriers and makes professors seem more approachable, friendly, and interested in helping
 - both for questions regarding course content,
 - but also academic and even career advising
 - True “mentoring” often takes place with IMs
- Caveats
 - Can lead some students to the perception that professors should be available to them 24-7
 - Students can stray off topic and waste time of both
 - Barriers = bad; Boundaries = good

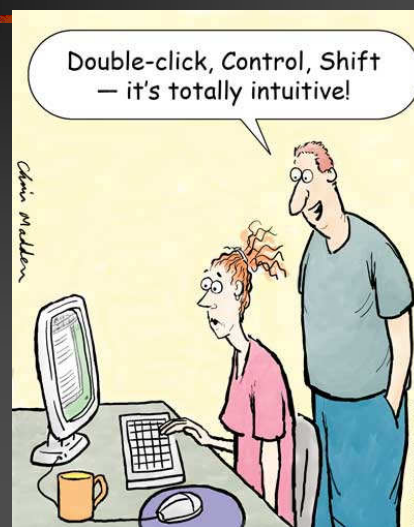
Part Two: Video Lectures

- Inspiration – City College video lectures on CUNY TV
- The “Push” – funding from the Alfred P. Sloan Foundation to CUNY to develop technology- and internet-based teaching
- The chosen approach – Voice-Over-PowerPoint
 - Much smaller files than full video (10 – 30MB)
 - Easily deliverable and viewable through Moodle, (deleted), youtube, Google sites, etc.
 - Students need only an internet connection and a web browser with a Flash player installed (freeware)

Voice-Over-PowerPoint (VOPP)

- Files are very easy to create
- You need a program that can create “screen shots” and recording audio at the same time. I used the Camtasia® Suite
- Before lecture begins, click on “record.”
- Lecture is given completely normally!
- Microphone needed, but computer-embedded mic is just fine.
- Remember students will not see YOU, only your screen
 - Thus, use the mouse cursor to point things out!

VOPP Demo



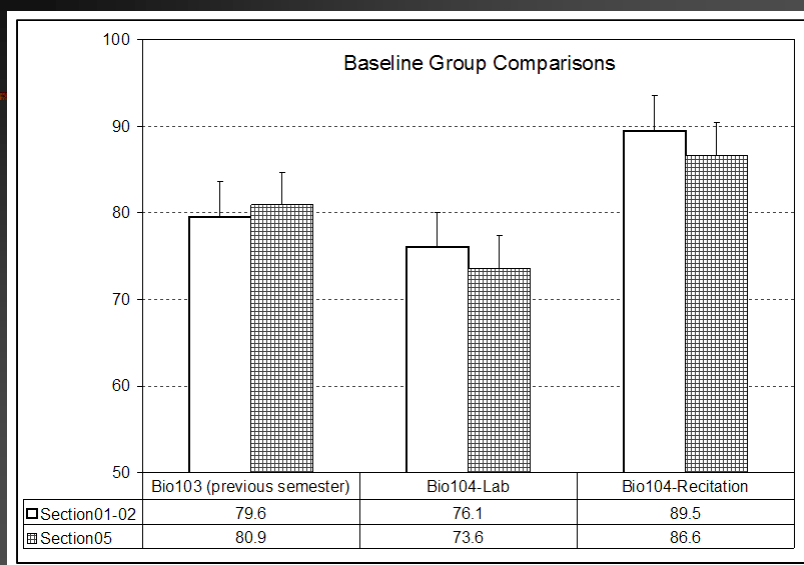
Experimental Setup and Data Collection

- Course – Bio104 (second semester of General Biology)
- Five Sections:
 - 01+02 – Meets as double section for lecture (control group)
 - 05 – Meets as single section for lecture (experimental group)
 - (03+04 taught by someone else, not included in this study)

Section	Format	Instructor	N attempted	N withdrawn	N passed
01+02	Standard Lecture	Lents	63	4	57
5	Mix: Standard + Video	Lents	25	1	24

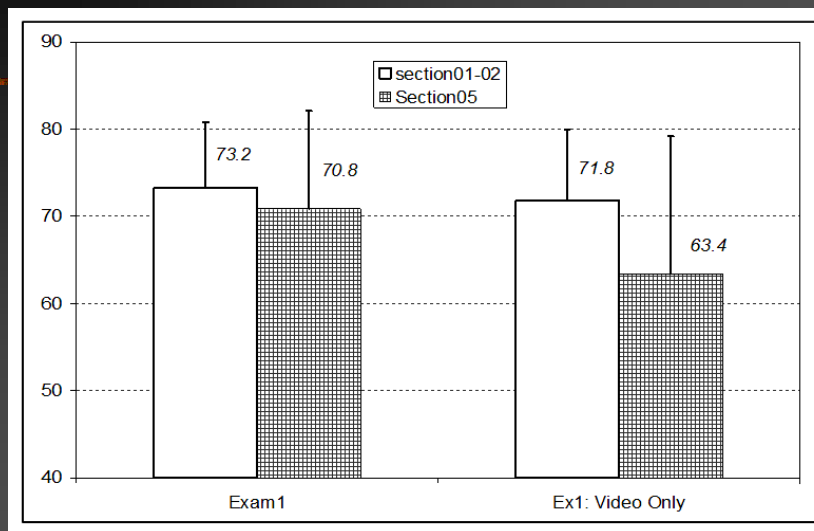
- For selected lectures:
 - Section 05 did not meet “live”
 - Rather, they were given, through BB, a VOPP recording of the lecture given to Section 01+02
 - Data Analysis – a) Exam scores; b) performance on specific questions testing concepts covered by the VOPP lectures

First, are the two groups comparable???



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Data – First Exam

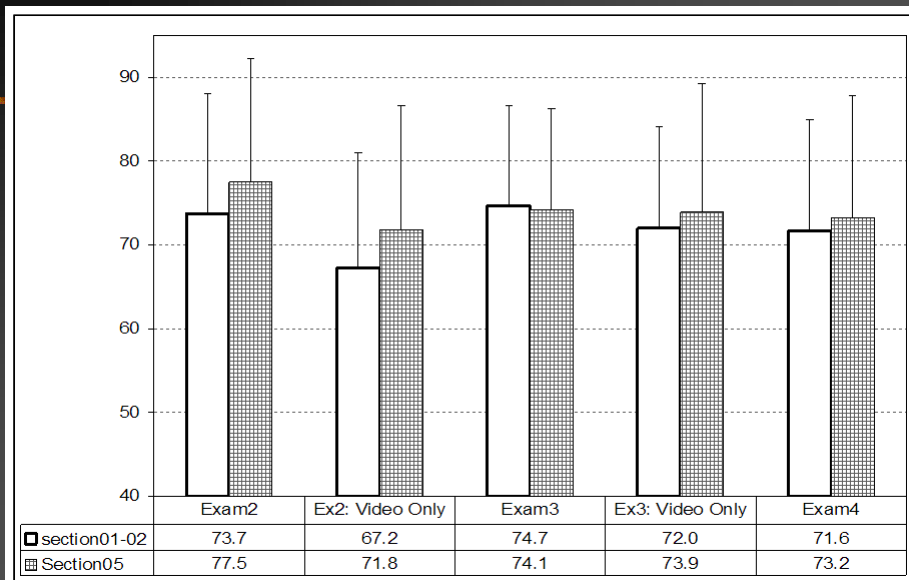


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A fruitful discussion

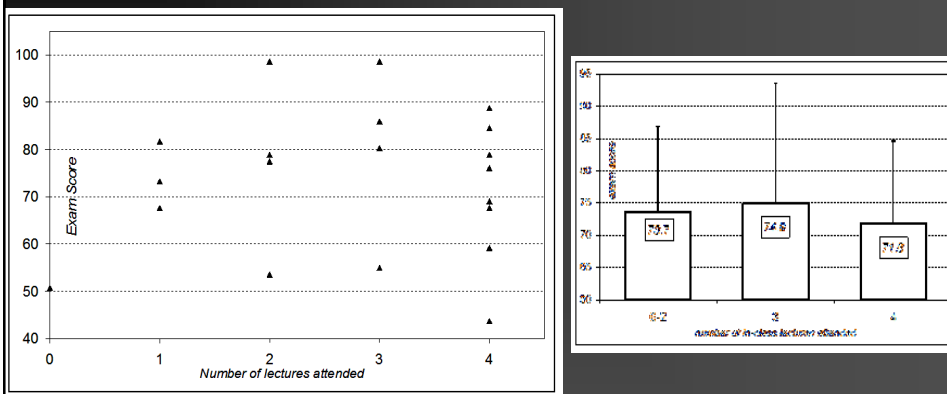
- Instructor asked, “what happened?”
- Many students confessed to feeling unengaged, bored, and easily distracted
- The class was almost ready to vote against any more video lectures
- A few classmates that preferred the video lectures then spoke up and offered the following advice to classmates:
 - Try watching the video with the textbook open, following along with figures
 - PAUSE VIDEO in order to write things down, so that you can fully listen while instructor is talking
 - REWIND VIDEO and repeat if you are unsure about anything
 - PAUSE VIDEO if you are still confused and look things up in the text or other sources, then continue after you get it
 - Watch videos AGAIN before the test
- In summary, those that LIKED the video lectures, frequently paused, rewound, and were actively engaged, not just passive watchers/listeners.
- The class voted to keep trying video lectures.

Data – Next three exams



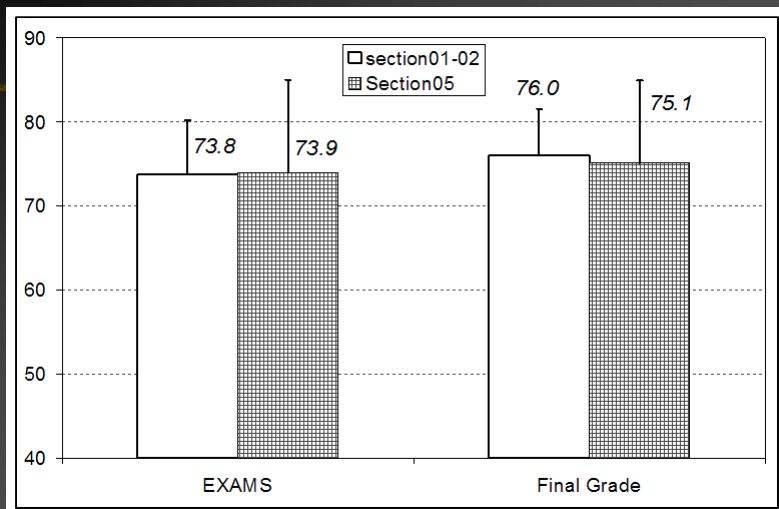
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Data – Optional Attendance (exam 4)



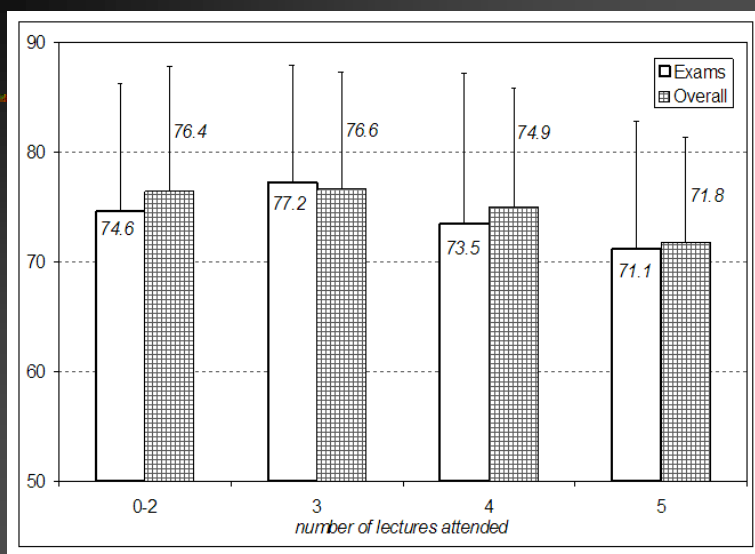
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Data – Final Scores



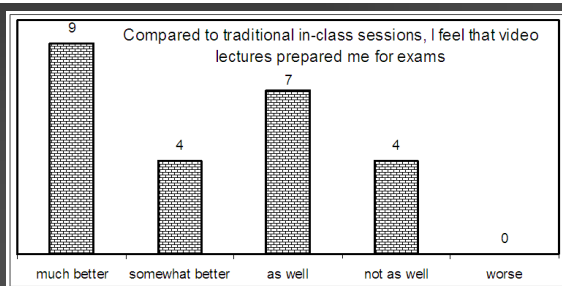
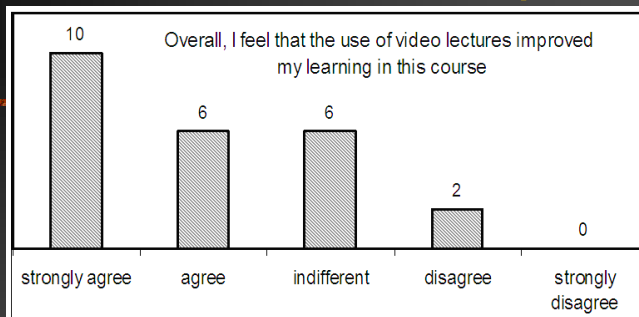
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Who prefers to come to class?



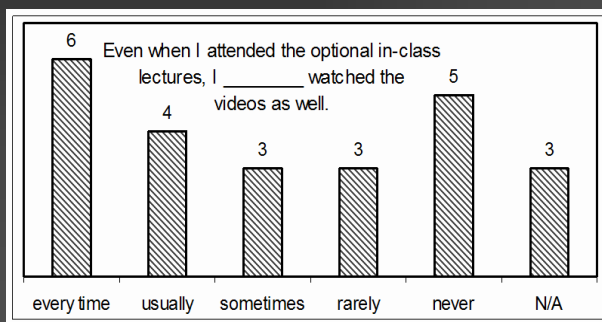
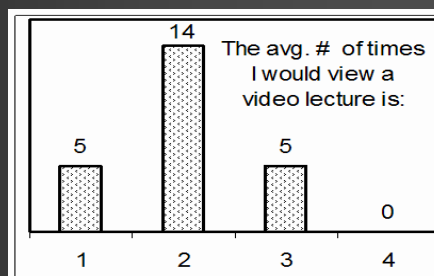
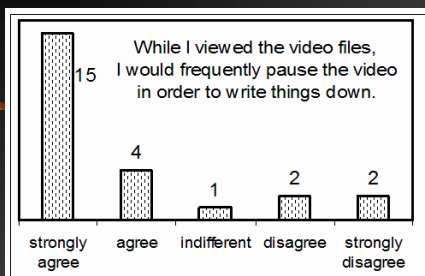
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Data – Student Perceptions



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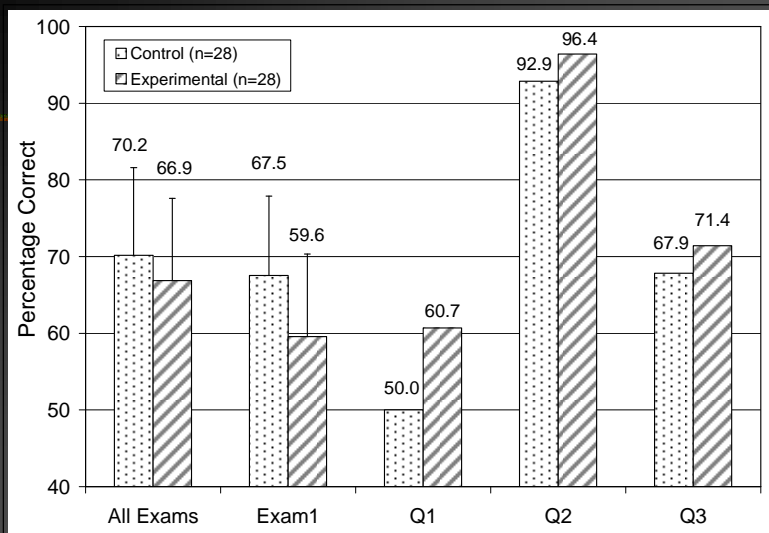
Conclusions: Lessons Learned

- VOPP lectures are simple to record, simple to view, and simple to post to BB
- Most students can learn core concepts of General Biology as effectively through VOPP lectures as in-class lectures
- When given the opportunity, most Bio students at JJC will watch a lecture more than once
- A large majority of students agree that VOPP lectures prepares them as well or better than traditional in-class lectures
- Most students support the increased use of VOPP/video lectures

Some Work in Progress

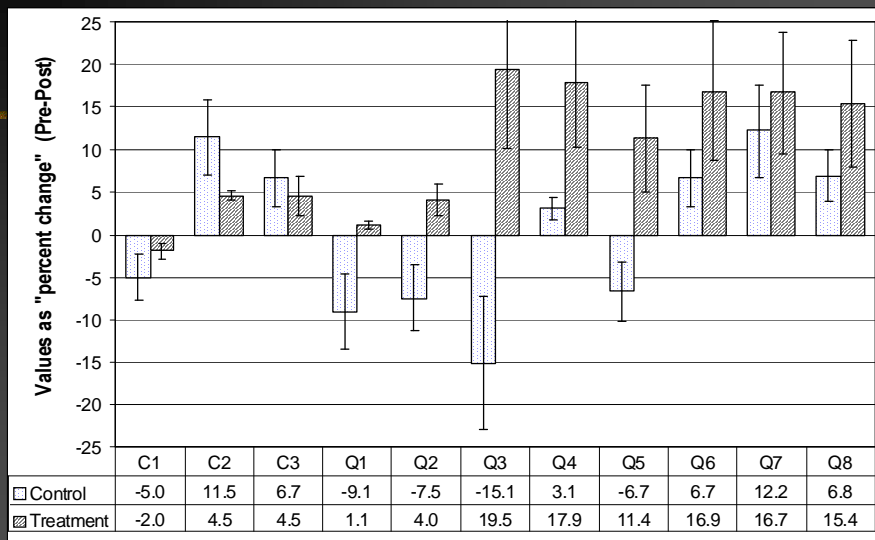
- Explicitly teaching the *Process* and *Nature* of science has been shown to facilitate significant content learning gains
 - This means data-driven, inquiry-based learning
 - Teaching content using primary data & experimental results (classic and recent)
- Introduction of process-centered content in several sections of Biology, Chemistry, Natural Science
 - Visionlearning.com (contact A. Carpi, John Jay College, acarpi@jjay.cuny.edu)
- Laboratory exercises that focus on “guided inquiry” of real primary data
 - Students behave like scientists. Design experiments, collect and interpret data, draw conclusions
 - First new lab – phylogeny and systematics (evolutionary biology)
 - Students explore the common ancestry of humans and close primate relatives
 - Use real DNA sequences, protein sequences, and chromosome density maps

Results



Lents NH, Cifuentes OE, and Carpi A. Revisions pending, CBE: Life Sciences Education, Jan 2010

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