Flipping the Sophomore Organic Chemistry Classroom

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Bucks County Community College

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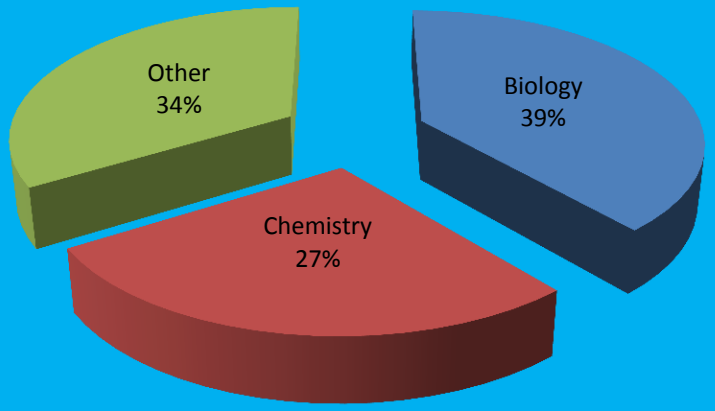
Organic Chemistry I and II at GCC

- Traditional Model
  - Organic Chemistry I and II typical composition:



  - Instructor gives in-class lecture on subject matter, assigns homework for students to do outside of class.
    - Advantages
      - As scientists lecture model comes naturally
      - Time tested
      - Know what material is covered in class
    - Concerns
      - Lacks student engagement
      - Student doesn't do or can’t do the assigned problems
      - Missed class = missed lesson
      - Declining test score trend

Organic Chemistry I and II at GCC

- Flipped Classroom Model
  - Instructor gives lecture via video for students to observe outside of class time, does problem solving during class.
    - Anticipated advantages
      - Instructor guides student through problems during class
      - Improved student engagement
      - More productive use of class time
      - Students able to replay videos multiple times/anytime
    - Potential concerns
      - Students still need to do homework – study the videos
      - Students must wait until class with questions
      - Student internet availability

Flipped Classroom Model - Styles

- Video record traditional lecture in classroom format
  - Requires video recording equipment (camera), free time in an unused classroom, a not so camera shy instructor, and someone to make the recording
- Video capture and record traditional PowerPoint slides with voice-over
  - Requires video capture software
- "Khan" style video
  - Modeled after the Khan Academy videos
  - Student sees a "blackboard" background with colored "chalk" writing
  - Hear only the instructors voice
  - Videos can readily be prepared using a PC and some additional hardware and software
  - Example:
    - Introduction to Chirality (6:45) http://media.collegeanywhere.org/view/content/15415

Technology

- Required software
  - Screen Capture Software
    - Snaget (TechSmith)
    - Camtasia (TechSmith)
    - Jing (freeware, http://www.techsmith.com/jing.html)
    - FrontCam (freeware, http://frontcam.com/)
  - Digital Free-Hand Drawing Software
    - SmoothDraw (freeware, http://www.smoothdraw.com/product/)
  - Video editing software
    - Video file conversion (e.g., avi to wma or mp4)
      - Easy Media Creator 9 (Roxio)
- USB tablet with stylus or touch-screen computer
  - Bamboo model CTH-470 (Wacom)
- Host server to house video lectures
  - CollegeAnywhere

Organic Chemistry "Lectures-On-Demand"

- Created >340 video "Lecture-On-Demand" topics to cover the two semester sequence of Organic Chemistry
  - Organic I – 41 hrs.
  - Organic II – 47 hrs.
- Organized generically by topic and arranged by chapter of whatever text in use
- Each topic typically between 10 and 20 minutes length
- Videos available to student by direct URL or through E-Learning (Blackboard) link to CollegeAnywhere
  - Electrophilic Aromatic Substitution – Nitration (10:23) http://media.collegeanywhere.org/view/content/15991

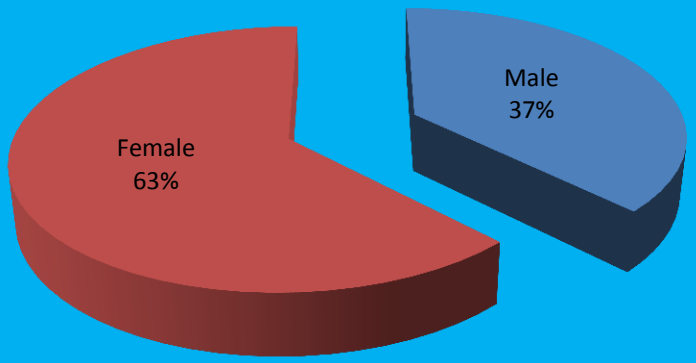
Other Course Grading Changes

- No points for attendance
  - Typically accounts for 90 – 95 points on average
- WileyPlus online learning environment
  - Online homework questions
    - 20 questions per chapter
    - 1 week to complete
    - 10% of grade
    - Typically accounts for 70 – 75 points on average
- Less bonus points offered
  - Reduced from 75 to 30 points

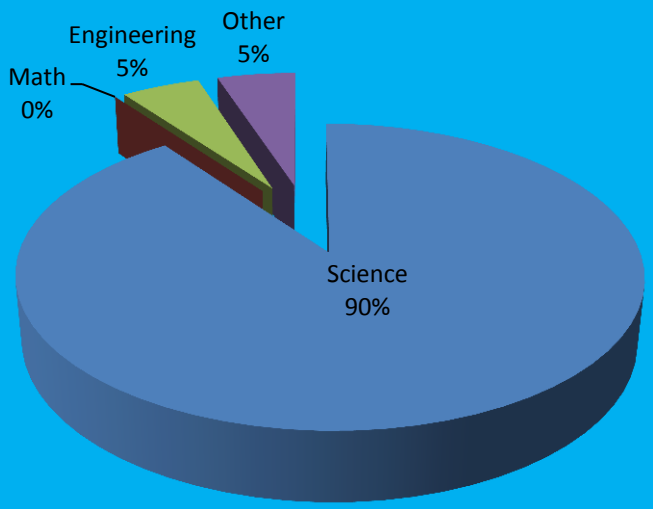
Student Demographics

Organic I/II

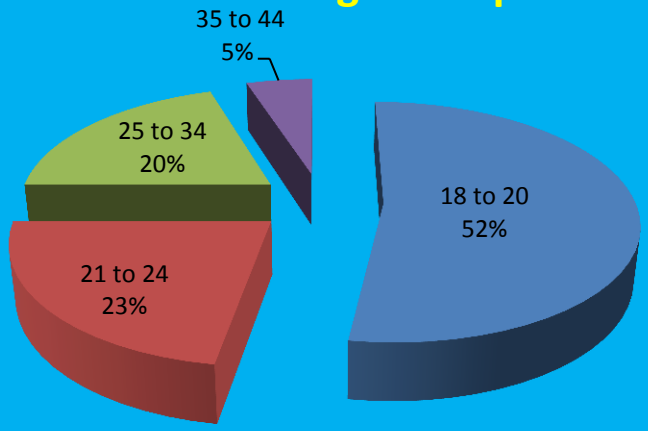
Gender



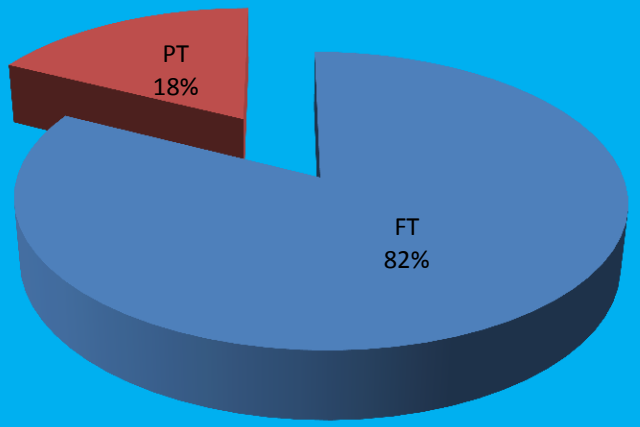
Major



Age Group



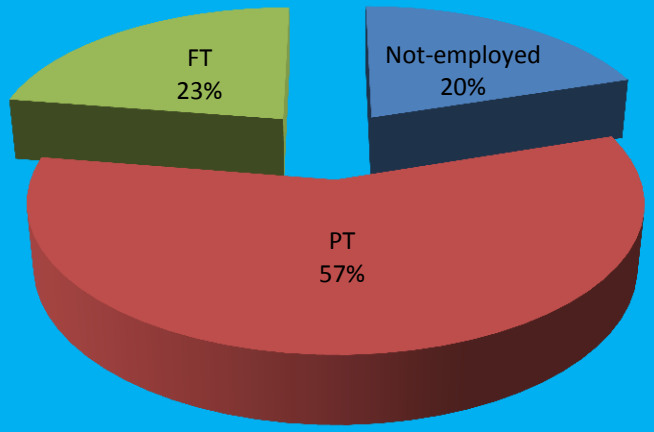
Student Status



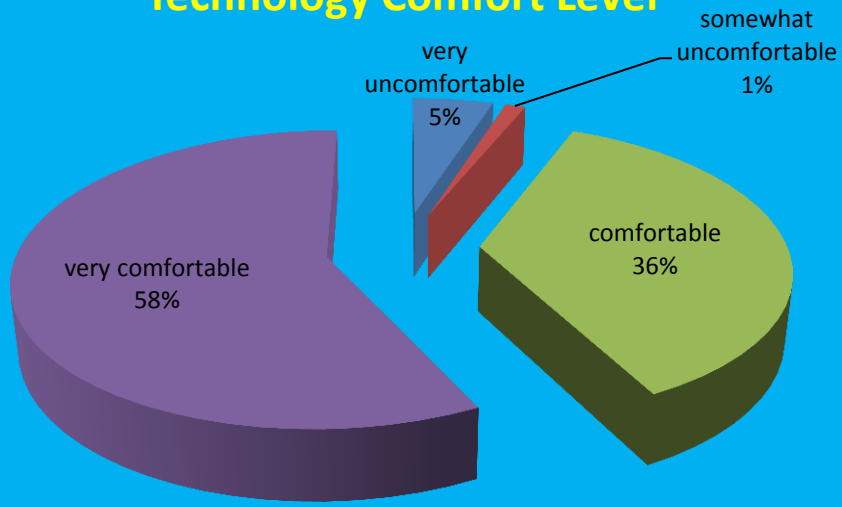
Student Demographics

Organic I/II

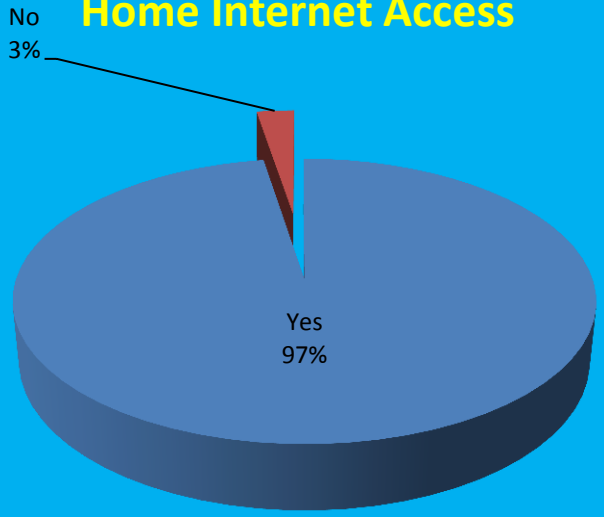
Employment Status



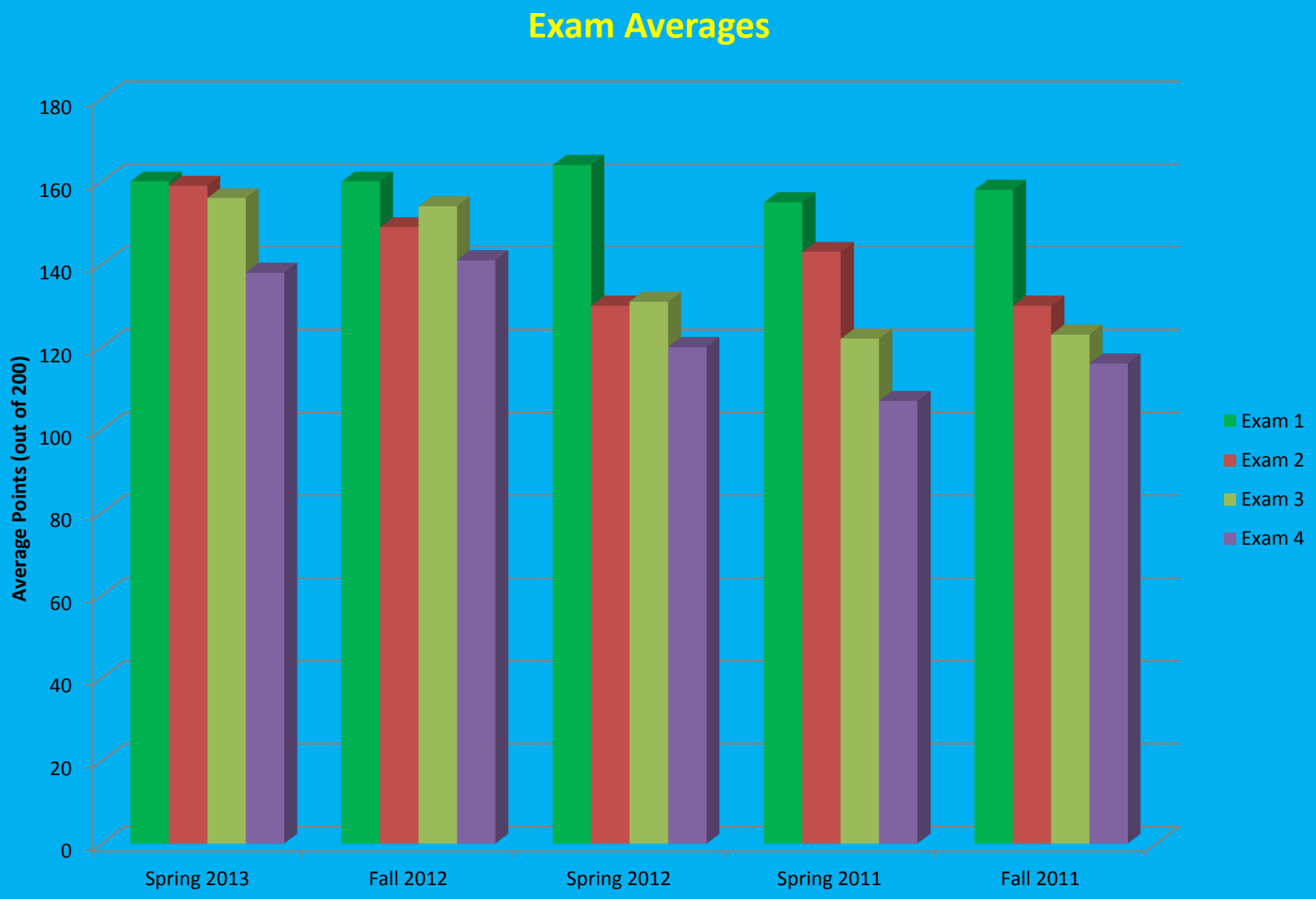
Technology Comfort Level



Home Internet Access



Student Learning Outcomes – Organic I



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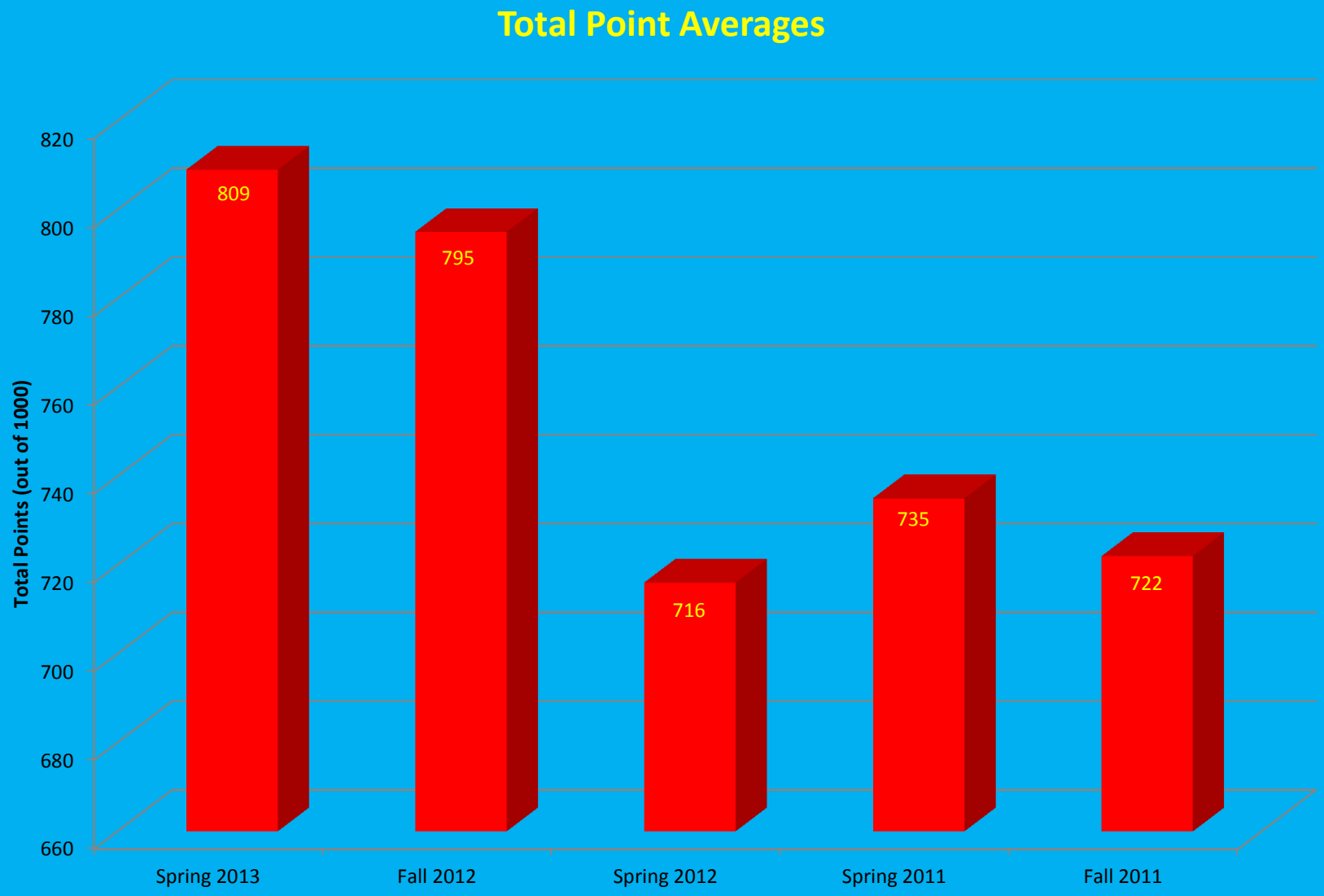
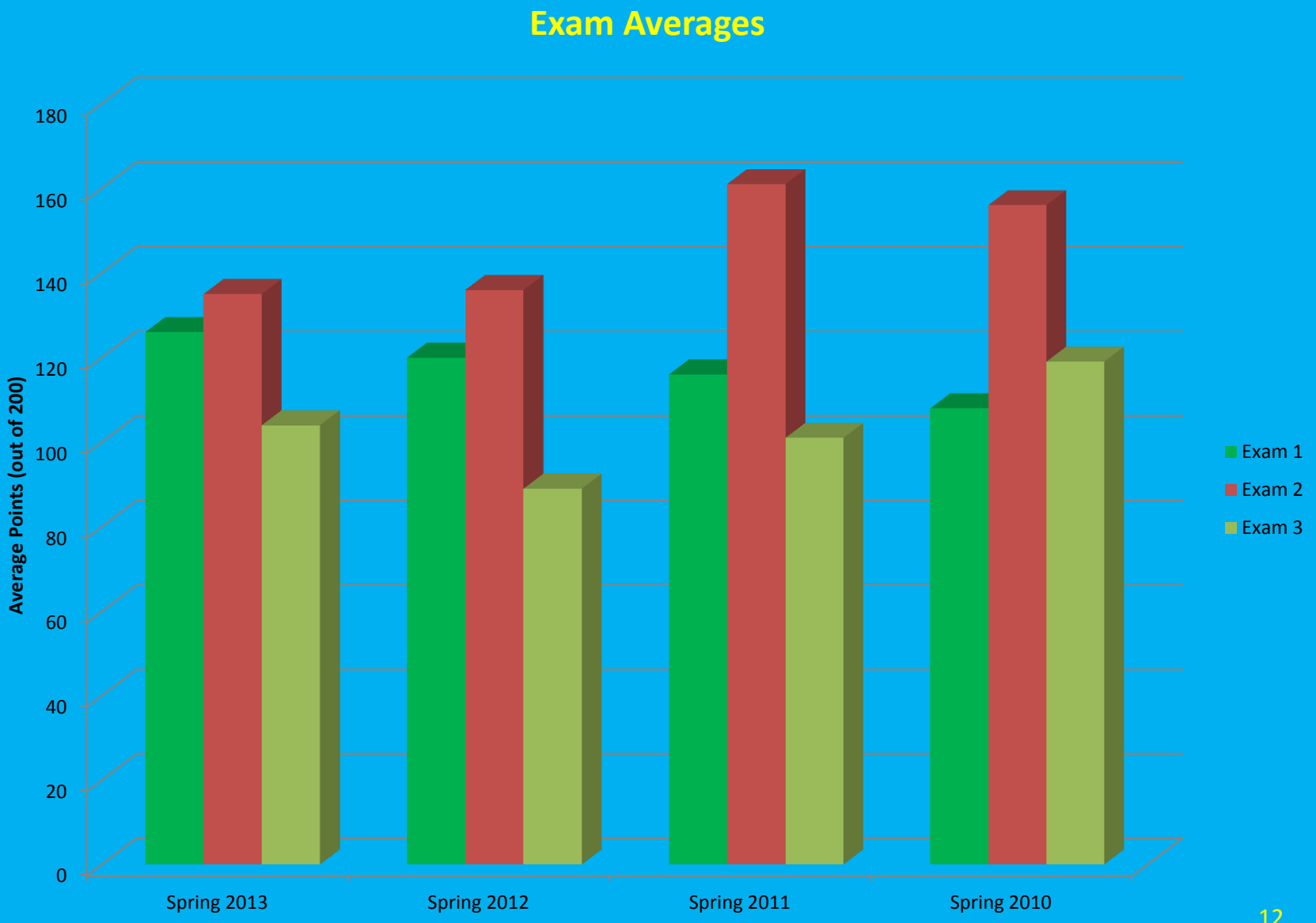


Student Learning Outcomes – Organic II



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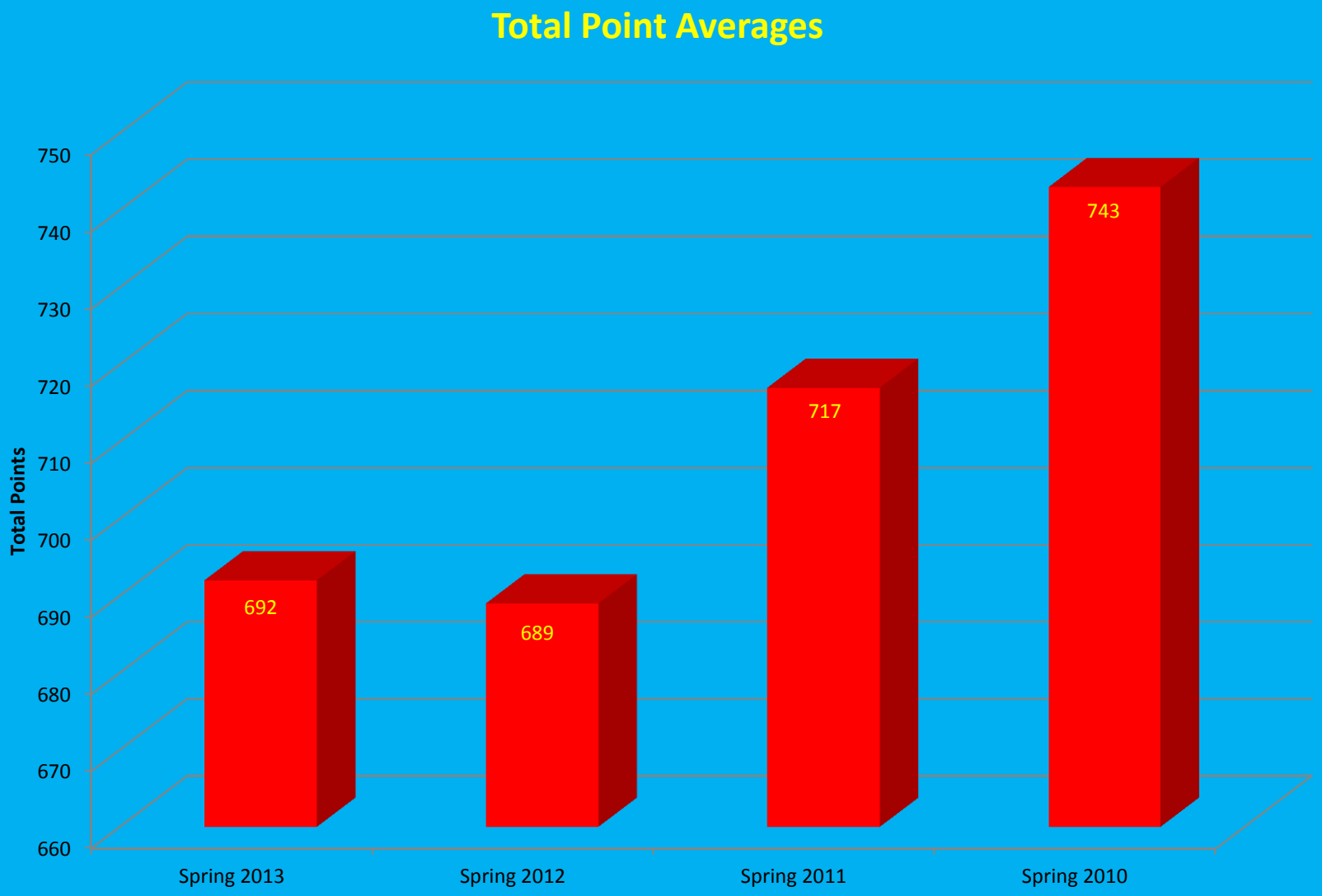
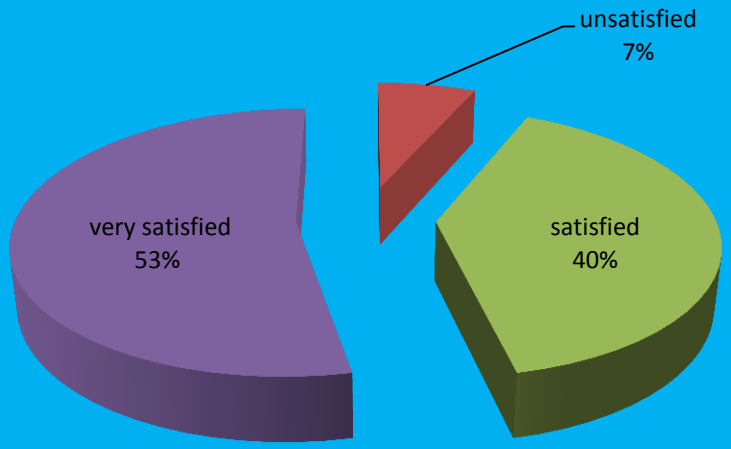
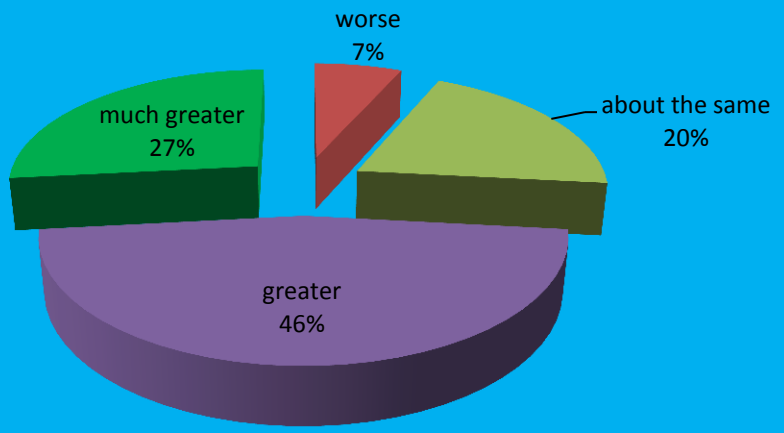


Student Evaluations – Organic I

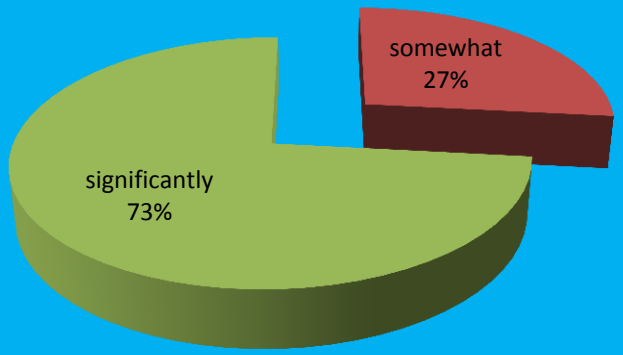
Student Satisfaction



Level of Understanding vs. Traditional

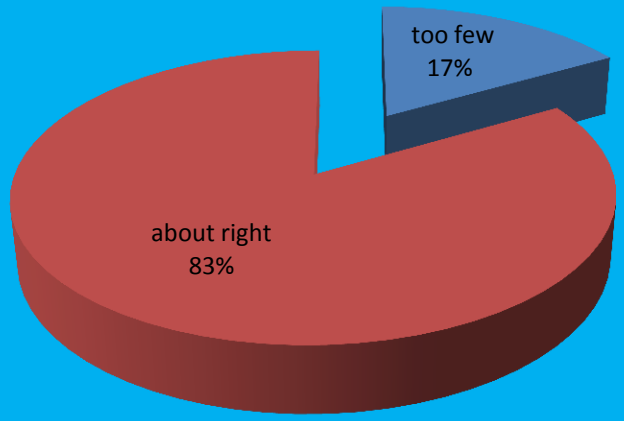


Helped with Organic Chemistry

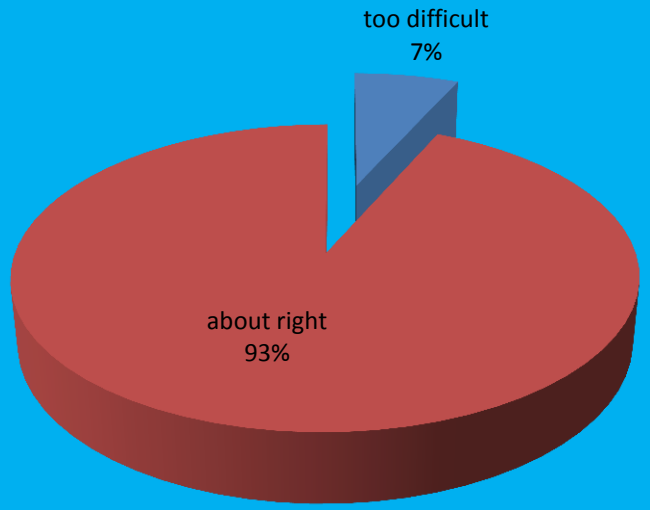


Student Evaluations – Organic I

Number of Problems Solved

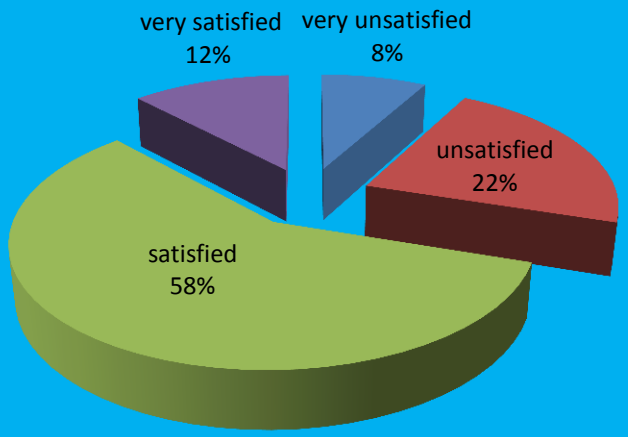


Difficulty of Problems Solved

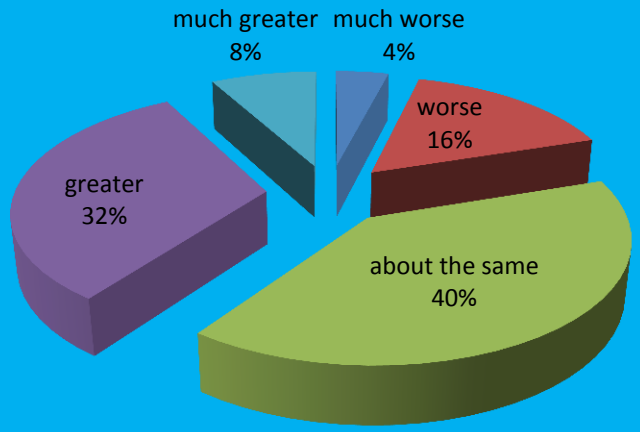


Student Evaluations – Organic II

Student Satisfaction



Level of Understanding vs. Traditional



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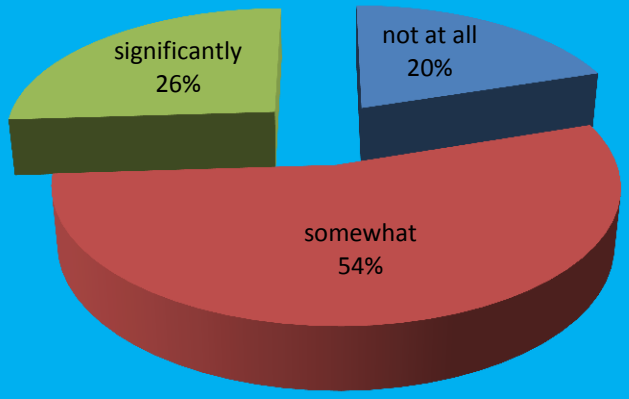

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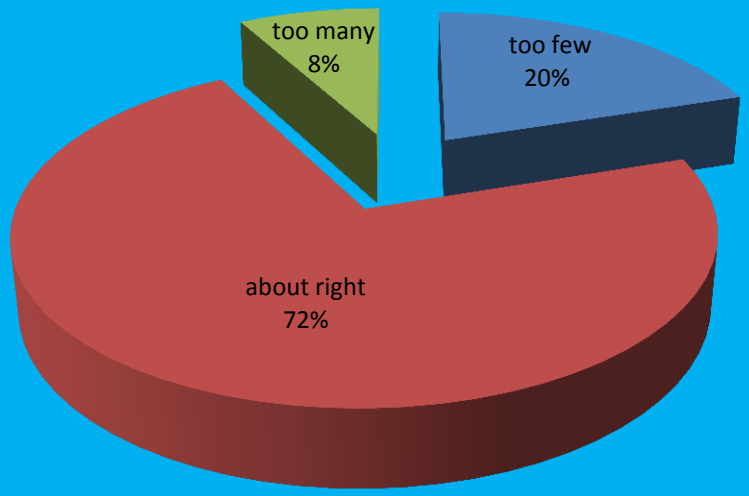

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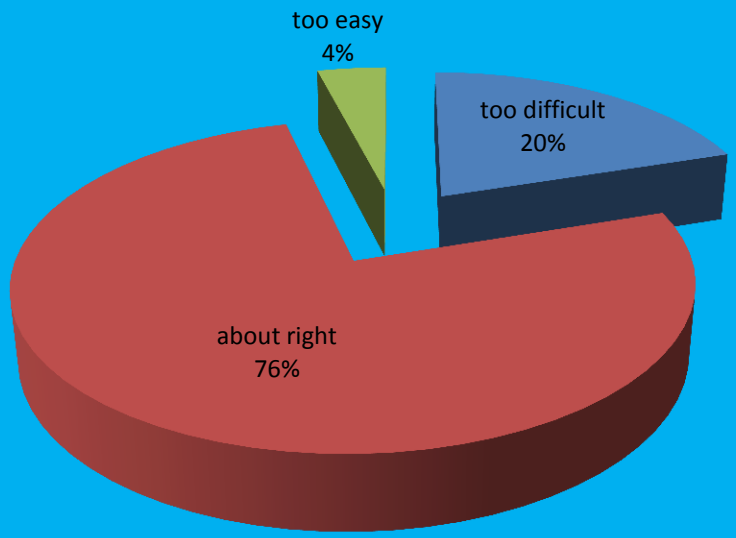

Conclusions

- Considerable up-front investment in time required
- Continue to employ flipped classroom model for both semesters of Organic Chemistry
- Model preliminarily showing success for Organic Chemistry I
- More trials needed for Organic Chemistry II
- Not the “magic” solution to learning
  - Students that don’t watch videos are lost