Dealing with Different Levels of Academic Preparation

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Teaching Seminar
Rutgers, The State University of New Jersey

October 13, 2010

The Challenge

- There are various levels of students
  - “Barely pass” vs “pass with flying colors”
- Keep the bright students interested...
- ...without overwhelming the weaker ones

Multiple Approaches

- Careful Planning
- Frequent Assessment
- Effective Classtime
- Personalizing Attention

Careful Planning

- Develop a list of essential information
  - Skills and background knowledge
  - Check prerequisites
  - Make this list explicit at the first class meeting

Section numbers refer to *Calculus: Early Transcendentals*, by Jon Rogawksi

Topic	Introduced in...	Needed for...	Comments
Concept of a Limit	2.1, 2.2	13.2, 14.2, 16.2, 16.4	
Computing Limits	2.3, 2.5, 2.6	14.2	
Differentiation Rules	3.1 – 3.10	Pretty much everything	
Concept of an Integral	5.1, 5.2	13.2, Chapter 15, 16.2	
Integration Rules	Besides the basics, you definitely need to know the following:		
Substitution	5.6	13.2, Chapters 15-17	Compare to 15.5
Integration by Parts	7.2	13.2, Chapters 15-17	
Area between curves	6.1	Chapter 15	
Arc Length, Surface Area	8.1, 11.2	13.3, 16.2, 16.4	
Parametric Equations	11.1, 11.2	Chapter 13	
Polar Coordinates	11.3, 11.4	12.7, 15.4	

Careful Planning

- Develop a tiered reading list
  - Core Reading
    - Central to the current course
    - Textbook, Supplements
  - Background Material
    - Necessary to understand the core reading
    - Alternate texts, websites
  - Enrichment
    - For interested students only

Careful Planning

- Plan a variety of assignments
  - Reflect various learning styles/strengths
  - Vary difficulty
  - Vary assignment type
  - Option: A “menu” of assignments
    - Students can choose what to complete
    - e.g. Many simple assignments vs. Fewer in-depth assignments

Frequent Assessment

- First-day pre-test on prerequisites
  - Use your “essentials” list
  - Students get confirmation of their level of preparedness
  - You know where the students stand

Frequent Assessment

- Give an exam in the first 2 – 3 weeks
  - Students get clear feedback early
    - Especially on their study habits
  - You get clear feedback early
    - Which students need extra help?
    - Are you as effective as you believe?
    - Are there class-wide trouble areas?

Frequent Assessment

- Give frequent assignments
  - Not necessarily graded
  - In-class
    - Ask for students to solve a problem or answer a question at their desks
    - Grade their own, or swap with neighbor
  - Out-of-class
    - Grade collected homework by next class
    - Address issues from homework in class

Frequent Assessment

- Collect lecture notes at random
  - You get an idea of how well they follow
  - Encourages students to take better notes

Frequent Assessment

- At the start of class have them:
  - Summarize the previous lecture
- At the end of class have them:
  - List the key concepts
  - Give definitions in their own words
  - Write a “Minute Paper”
    - e.g. “What was the most significant thing you learned today?”
  - Give their own examples, applications, associations

Frequent Assessment

- “Just In Time” Assignments
  - Online assignments are possible via Sakai
    - Assignments, Drop-box, or Tests/Quizzes tools
  - Can assign pre-class work
    - Rudimentary material
    - Enforced reading ahead
  - Due the evening before class
  - Look over their submissions before lecture
    - Adjust lecture accordingly

Effective Class-time

- Teach to the level you expect students to reach
  - Aim for the bright middle: B students
    - Have a clear picture of a B student
  - Students learn more when course is just above current level

Effective Class-time

- Frequently ask them questions
  - More than “do you understand?” or “any questions?”
  - Ask specific questions
    - Explain a concept just covered
    - Give their own example, application, association
  - Gauge response for detail and accuracy
  - Repeat the material if necessary

Effective Class-time

- Be aware of who speaks most in class
  - Is it only the brighter students who follow class discussion?
  - Direct comments, questions, follow-ups to the entire class

Effective Class-time

- Watch for non-verbal cues from students
  - Trouble taking notes
  - Blank stares
  - Quizzical looks
  - Texting
- “I seem to be losing some of you. Let me explain this another way.”

Effective Class-time

- Arrive to the room early
  - Chat with students
  - How are they following along?
  - What questions from last class? the readings?
  - Address these questions in class

Students Having Difficulty

- Prepare supplementary background material
  - Glossaries of terms, examples
  - Alternate text resources
  - Ways to improve basic skills

Students Having Difficulty

- Be familiar with campus resources
  - Know the tutoring resources
    - Math and Science Learning Center
    - Rutgers Learning Centers
  - Be positive, but put some pressure on
    - “You could benefit a lot from tutoring. Go down to the learning center and see what they can do. Let me know what you come up with next week.”

Students Having Difficulty

- Invite students to office hours
  - Explain to freshmen what office hours are
  - Get a group to come in together for a group review session
  - Write a “See me in office hours” note on an exam
    - Better than a vague in-class verbal announcement

Students Having Difficulty

- Encourage students to set up study groups
  - Set up a forum for them to arrange meetings with each other
  - Set up the study groups yourself
  - Both stronger and weaker students benefit
    - Tell them this

Students Having Difficulty

- Give them examples of good work
  - Not extraordinary work
  - Distribute copies of a B or B+ assignment
    - Get permission from the student
    - Make it anonymous
  - Students can see your criteria and expectations

Students Having Difficulty

- Show how to do the tasks set for them
  - Their weaknesses are with specific skills
    - e.g., solving systems of equations
  - Take class-time to model:
    - Approaching unfamiliar problems
    - Reading mathematics
    - Taking effective notes
    - Studying effectively
    - Taking exams strategically

Encouraging the Best

- Prepare enrichment materials
  - e.g., Special assignments, recommended readings, additional problems
  - May not follow through, but relish attention
- Use office hours to do in-depth analysis

Conclusion

- Discern the essential prerequisites
  - Make sure students know them, too
- Keep track of students' progress
  - Frequent assessment
- Aim class at the “bright middle”
- Identify and help students having difficulty
  - May need help with basic study skills

References

- Erickson, Bette LaSere et al. *Teaching First-Year College Students.* 2006.
- Davis, B. G. *Tools for Teaching*. 1993.