

**Third Annual CONNECT Math Conference
February 26, 2010**

Summary of Mathematics Town Hall Meeting Carousel Activity

The Town Hall Meeting engaged math faculty in a carousel activity which had them think, write, share and discuss their thoughts and experiences on topics all math instructors deal with:

1. How do we get our students to work, to invest the time and energy outside of class necessary to promote learning?
2. How do we help our students to develop the confidence that they can experience success in mathematics?
3. How do we get our students to discover the intellectual curiosity and sense of academic purpose which motivates learning?
4. How do we serve our students as faculty mentors, helping to instill the good habits and positive attitudes that form a self-directed learner who will be able to successfully transfer to their next experience, either at their current college, as a transfer student at another college, or in life after college?

The many pages of written comments as well as the note taker's summary sheets are summarized below for each of the four questions. Every effort was made to include all comments, without duplication, and to organize them in a manner which would make them more useful for faculty to consider and put into use in their own teaching.

Question 1:

How do we get our students to work, to invest the time and Energy outside of class necessary to promote learning?

Summary of responses:

- Value their time and effort
 - Give credit for completing homework assignments
 - Give credit for anything you value; students will value what you value
 - Make the homework grade a percentage of the final course grade
 - Offer incentives to do homework
 - Reward all work done out of class, whether done correctly or not
 - Offer extra credit for work done outside of class
 - Praise all work done outside of class
 - Offer assignments that will add points to their test average
- Give test and quiz problems based on homework problems
 - In advance, let students know that test and quiz problems are based on the homework problems
 - Give regular short in-class quizzes taken directly from the homework assignments
- Encourage group work and study groups
 - Set the expectation that students should learn from and be responsible to each other
 - Provide students with a safe and supportive environment where they can work together, both in and out of class
 - Assist students in creating study groups outside of class
- Illustrate why doing homework is so important to their success
 - Make your reasons for assigning homework very clear
 - Show students the correlation between homework completion and exam scores
 - Learning mathematics is not a spectator sport; you must do it and practice it, not just see others do it
 - Students must feel that if they apply themselves, the work will pay off
- Make homework meaningful
 - Give assignments that appeal to their interests, that they will want to work on
 - Make assignments meaningful, interesting and relevant to the real world
 - Assign non-traditional activities, where they can apply material taught in class
 - Show students how the coursework is important to their academic program and/or career choice
 - Give problem based learning assignments drawing on newspaper, library and online sources, as well as on each other
 - Be sure that all assignments are valuable to the student and that it is clear that you value their time and effort
 - Have students each write five questions that could be used on a test

- Use online resources
 - Give online homework assignments, using one of many web based resources
 - Provide students with information regarding online supportive technology and other related materials
 - Give problem based assignments which require students to utilize online sources
 - Try a web chat; some reluctant speakers are more likely to participate in online conversations
- In-class strategies
 - From day one, make your homework expectations very clear
 - Clearly discuss and outline successful strategies for doing work outside of class
 - During class, make frequent reference to reading and homework assignments
 - Announce assignments and approaching due dates at the start of class
 - Be accommodating with students regarding extensions and due dates, while making it clear that the work must be completed
 - Make accommodations for students who may not have the text book
 - Design class activities that require outside work and for which they must be prepared for class
 - Give a reading guide to provide structure to accompany reading/assignment
 - Start a topic, just enough to get them curious, then leave certain details for homework
 - Describe the beauty of the benefit of doing homework assignments
- Promote instructor-student interaction outside of class
 - Explain what “office hours” are, and encourage use of them
 - Set a designated time to meet for coffee and a problem session
 - Set an example: Let them see that you are investing your time in them and in the course
- Make it as easy as possible to get immediate help on assignments, by one of the means above

Question 2:

How do we help our students to develop the confidence that they can experience success in mathematics?

Summary of responses:

- On Day 1, make sure students are placed in the proper class
- Success breeds success
 - Start small and simple, with work students are able to do
 - Give students experiences which build their confidence; start with topics that are accessible to students and work from there
 - Recognize even small successes, before moving on to larger tasks and correctness
 - Start with a variety of interesting problems they can solve
 - Success will come from them doing it themselves
- Create a class climate which:
 - is safe
 - encourages students to talk, to speak out
 - encourages students to explore and try new ideas without sarcasm, cynicism, or criticism
 - values diverse approaches and ideas
- Student centered classroom
 - Have students do math in class and encourage them by showing them what they have done correctly
 - Have students present work to the class in a non-threatening environment
 - Encourage study groups, group work and partnering, both in class and out
 - Have them actively engage in mathematics in class so we can give them corrective and supportive feedback
 - Have them work collaboratively in class so mathematics is not viewed as an individual undertaking
 - Have students work on a problem then talk to each other about solution; discussion will become about how to do the problem than just about the solution
- Give them the tools to be successful
 - Teach study skills and a clear plan of how to succeed in mathematics
 - Create clear objectives and a plan/pathway to achieve them
 - Promote student engagement in the material, in their own success and the success of the class
 - Engage students in a variety of ways to learn the material
 - Encourage exploration of different ways to solve problems

- Faculty strategies,
 - Offer other opportunities for students to illustrate knowledge besides exams
 - First focus on students completing the task, then on getting the details correct
 - Give a practice test
 - Give a short quiz every class
 - Ask questions throughout class; keep students involved
 - Teach that confusion and hard work are a part of problem solving
 - Share with students your struggles with math, that you did not and do not get everything right, no one does, that problem solving is a process
 - Be a model: Let the students see you as a motivated learner and instructor.
 - Teach that math is comprehensible, more than a collection of memorized procedures
 - Preach that one should never give up, always be patient, always practice more, and each person will experience success.
 - It's OK to make mistakes, it's how we learn
 - Provide opportunity on certain assignments to re-do and re-submit
 - Set high standards, give them the tools, offer support, and they will rise to them
 - Give positive feedback, see the glass as $\frac{1}{2}$ full: Have student explain what they have done, note what has been done correctly and go from there
 - Provide different presentations that address different learning styles
 - Focus on explanations and “showing your work” rather than on answers
 - Provide quick and frequent feedback
 - Provide the opportunity to retest or redo material
 - Provide case histories of previous students who were like them and who succeeded. Have a student who transferred to a 4-year college visit the class
 - Identify students who seem to “get it” and have them work with weaker students
 - Share stories about past students who struggled when they first entered class, but turned out to be one of the best students
- Pick good problems
 - Focus on good problems, not just good procedures
 - Use problems with multiple entry points
 - Show everyday life connections, math they can relate to
 - Use problems they have already solved before, cooking, shopping, building, and show them the math they already know
 - Give them a variety of interesting problems that they can solve or begin to solve with skills they bring to class
 - Adapt problems to focus on the interests of the students
- Use a variety of models and tools
 - Use different models and tools
 - Give them the resources to learn, instructional tools
 - Tutoring/extra help experiences should vary
 - Let them experience mathematics in a different context/style than they have seen before

- Services/resources to students
 - Provide students with tutoring services
 - Provide students with online math help services
- Faculty/Student interaction
 - Show students that you care about them, that you are interested in their success
 - Be empathetic to their challenges, yet maintain high standards for success
 - Give individual support and private communication to a student (a comment before or after class, a note on a returned paper, an invitation to meet with them during office hours)
 - Show your sense of humor, that you are human, that you make mistakes; this personal relationship will make them feel more comfortable
 - Show each student that they are unique and special
 - Practice patience in working with students
- Office hours, One-on-One time
 - Walk students to your office: “Here I am”
 - Show concern; privately invite a student to meet with you during office hours where you can take a step back and start working with the student from a point where they are more confident
 - Offer a private pre-quiz or pre-test to settle nerves and break through any anxiety
 - At developmental math level, offer a little “hand-holding”, tutoring, to get student that first “A” or “B”, so they know what success feels like
- Frequent Praise
 - Praise good questions and good answers in class
 - Praise understanding. Encourage them by pointing out “minor” errors as opposed to lack of understanding.
 - Praise good work on tests and quizzes
 - Praise effort

Question 3:

How do we get our students to discover the intellectual curiosity and sense of academic purpose which motivates learning?

Summary of responses:

- Learning is natural human activity; clear the way for it; don't build obstacles; get out of the way.
- Use student centered, student experience driven, real-life problems
 - Teach math for problem solving, not as an exercise in the abstract
 - Curiosity of purpose is fostered more in a project based environment than in a note taking environment
 - Students take ownership of project work (or a research paper), drawing on their own background and ideas and sharing these ideas with other students in class
 - Make math relevant to students by asking them what they are interested in and doing related mathematics. Contributing to the classroom community in this way will promote student "buy-in"
 - Formulate problems using data that is of interest to them (particularly in a stats class), and topics that are relevant to their major or their interests
 - Students come to class with their own values, experiences, ideas and interests. Use what they bring to the class and model applications around it, creating a student centered academic exercise unique to each class
 - Get students to talk about their life goals and how they relate to academic purpose and success in your course
 - Relating math to real life will make students see the purpose of what they are learning
 - Students will experience ownership of their work; have them present it to the class, valuing diverse approaches and ideas
 - Have students investigate how their work relates to other disciplines or other topics experienced in their college career
 - Investigate how such a process arises in life, outside of college
 - Work on interesting and challenging real-life problems in class, in groups
 - Have high expectations: "You can do this!"
- Model academic curiosity
 - Practical application: You, as instructor, can give examples of how you get motivated to study the topic, why the topic is worth studying, what are the practical applications
 - Be excited about what you teach; relate personal experiences
 - Model the behavior: get excited about cool things and share your excitement
 - Discuss cool things students have done with mathematics

- Inquiry based experiences
 - Teaching approach needs to draw them in: Allow their questions to fuel discussion. Prompt but don't tell. Ask questions with less obvious answers, letting class brainstorm before stepping in
 - Challenge students with different types of questions, problems, puzzles
 - Ask: How else can we solve this problem?
 - Have students pose questions to investigate
 - Throw out some extension topics for students to investigate; pretend you want to learn everything, that can become a habit of pride
 - Ask where we left off last class. Address questions left over from last class, this may lead to clarification and/or discovery
- Challenging mathematics
 - Find time to devote to a topic the class finds interesting; don't rush on to the next topic
 - Search to find interesting non-mundane problems that go beyond their previous experiences
 - Have them work together to do the "hard" problems at the end of the section
- Mathematics as a humanistic endeavor
 - Discuss how mathematics has contributed to almost every other field and allows us to talk about the human condition
 - Expose students to mathematics as a humanistic endeavor, the beauty, the wonder, the intellectual activity
 - Weave the value of academic activity into the fabric of the course
- Fill the student's "basket" with encouragement to go on (Becky Packard's keynote)
 - Give extra credit for research
 - Encourage presentations at conferences
 - Acknowledge hard work when you see it
- Discuss history of math, it might inspire
- When we stop learning math, doors will close

Question 4:

How do we serve our students as faculty mentors, helping to instill the good habits and positive attitudes that form a self-directed learner who will be able to successfully transfer to their next experience, either at their current college, as a transfer student at another college, or in life after college?

Summary of responses:

- Model positive professional behaviors and values
 - Coming to class with a positive attitude, show your enthusiasm
 - Allow your joy and excitement to shine through both in and out of class
 - Have seminars, reading groups, and other activities where students experience, see, and share your excitement and the value of life long learning
 - Be excited about the beauty of what you teach
 - Show students your thought process
 - Model problem solving strategies
 - Show that making mistakes is a part of the process of learning; that the occasional mistake by instructor or student is a natural event
 - Model problem solving behavior and strategies
 - Help the student in ways that you can, but direct them to a better source of information if there is one
 - Be accessible; show that you care about their success
 - Be on time and prepared for class
 - Get assignments back in a timely fashion
 - Show students that you like your job
 - Exhibit patience, flexibility and respect for all others
- Share your experiences
 - Share your teaching and life experiences, things to be prepared for, relevant experience and difficulties students can expect
 - Allow students to get to know you, they will be more committed to the class and more likely to take good habits and positive attitudes from the experience
 - Relate your own experiences as a student
 - Keep office door open as often as possible
 - Be transparent about what you know, don't know, and how you can help as a first step
 - Be transparent about your own experiences

- Get to know the student
 - Talk and meet with students outside of class in varying situations
 - Encourage them to follow up on interesting mathematical questions and consider presenting at conferences (e.g. the Undergraduate Research Conference at UMA)
 - Show interest in your students, encouraging conversations outside of class regarding college experience and plans for the future
 - Encourage office hour visits
 - Show students that you care about their success and their lives
 - Encourage students to continue on with their studies
 - Engage them in discussion of future possibilities
 - Learn what else is going on in the student's life

- In-class strategies
 - Take time for socialization in class: introductions, interaction, name game, name tags
 - Encourage and compliment all successes
 - Give balanced feedback: this is what is missing, here is what you need to do, you can do it
 - Build-in success: create opportunities for every student to experience success
 - Have realistic goals and expectations
 - Provide resources and strategies in your class that students can use in a future experience, even if they do not have the same type of personal attention/support
 - Direct students to resources, video, online, materials, tutoring, etc.
 - Show students where they may use the math in your course, beyond the course
 - Answer questions using your personal experience
 - Provide framework in class for big projects; milestones, pieces
 - Build confidence in the student; use praise
 - Discuss with students how mathematics (and other disciplines) takes time and effort, even for the best mathematicians. We all struggle and get confused at times, it is part of the learning process
 - Let them see you struggle with a math problem
 - Ask questions that require critical thinking, addressing what they know, how to organize their ideas, and how to explain their thinking
 - Engage students in interdisciplinary and modern mathematics related to the topic at hand
 - Spend part of class advising students regarding subsequent courses, at your college and also at a potential transfer institution
 - Foster an atmosphere where they can ask questions with no fear of being put down

- Ways of learning and succeeding
 - Teach study habits
 - Encourage and help facilitate study groups
 - Have students work collaboratively, learning to depend on each other
 - Create an open and safe learning environment
 - Coach students on effective study habits
 - Giving students the “tools to learn” and the “desire to learn”
 - Encourage students to ask questions
 - Discuss issues related to metacognition
- Build confidence
 - Break down their walls concerning mathematics
 - Teach them not to underestimate their academic abilities
 - Start with structure, provide less as time goes on, and be transparent as to your reasons
 - Encourage participation in intellectual extracurricular activities, such as math team participation and tutoring
 - Activities done in class, by themselves and in groups instill the confidence in their ability to learn
 - Give students academic skills for the class that can be transferred to other academic experiences and to the workplace
- Help student look to the future
 - help students appreciate, understand, take advantage of their time at school, and also understand how it can positively affect future pursuits
 - Provide information about transferability
 - Encourage students who are transferring to visit your college transfer counselor and also to contact the prospecting transfer institution
 - Define the AA, BA, MA, PhD (and other) degrees; discuss differences