

## **REFLECTIVE STATEMENT ABOUT TEACHING AND LEARNING**

When I first began teaching Mathematics, my goal was to make the material “easy” for my students. I would carefully demonstrate a procedure for solving a particular type of problem, and then provide the students with plenty of carefully selected practice problems. I lectured and assumed they absorbed every word. For assessments, I would design in-class tests with problems worded exactly as those on the homework. I recall vividly a student who came to me in tears saying “I know how to do every procedure, but I still can't pass a test. I've taken the course three times and I'm failing again!" When I examined her test, I found that she could indeed perform all procedures with perfection, but always performed those procedures in the wrong place, at the wrong time. "Clearly you don't understand what you're doing," I told her. She responded (literally): "Nobody ever said I was supposed to understand!"

That student caused me to begin to question my teaching, I realized that neither my teaching style nor my assessments encouraged the students to understand the Mathematics. “Learning” in my classroom was often mimicry without understanding. I was employing what a colleague (Dr. Barbara Ferguson) has called the “lecture and puke” method – I lecture, the students “puke” it back on the test. I realized I never really knew what the students were thinking. I realized I never encouraged the students to explore the material or take responsibility for their learning. I realized that my assessments were not consistent with my desire for the students to understand Mathematics. I began to change my teaching style and assessments.

### **Writing in the Mathematics Classroom**

The first change in my teaching focused on assessment. I started asking students to routinely write about the Mathematics, explain their reasoning or their approach to a problem, explain why a certain procedure is valid, compare alternative methods for solving a problem. I allowed students to correct their tests, as long as they thoroughly explained what they did wrong and why it was wrong. The use of writing has evolved to the point that I now go so far as to ask students to write short stories about the Mathematics and provide metaphors for mathematical concepts.

Students were very resistant to writing in the Mathematics classroom. I would often hear the complaint “This is a math class not an English class!” I found that explaining why I was asking them to write, providing guidelines or rubrics for their work, and giving them opportunities to get feedback from me on how to improve their writing helped overcome their complaints. I found that the fight was worthwhile – I was gaining invaluable insight into their thinking and they were required to think, to make sense of the Mathematics using their own words. I sought out opportunities to learn about other ways to change my teaching to produce greater student involvement and learning.

### **Engaging and Challenging Students**

My experience with writing led me to try other techniques – term projects, reading assignments, student presentations, group work, class discussions. The level of involvement I require during class is now such that a student recently made the following comment as I entered the classroom: “Dr. Garner, could you just lecture tonight. I'm tired. I don't want to have to

think.” I also require as much work as I dare outside the classroom and make myself available as much as possible to help students in their struggle with the Mathematics.

I now believe my job is not to make Mathematics easy for them. Mathematics is not easy. My job is to guide them in their struggle to make sense of the Mathematics by setting up a classroom environment that encourages questioning and by guiding them through a series of well-designed assignments. I want to keep them working and thinking; this requires me to be available through technology, office hours, and special study sessions. Nothing pleases me more than to see groups of students gathered in the fifth-floor Mathematics conference room working on problems and sending an occasional “representative” from the group to ask a question. I find success in comments such as:

“It (the class) made me think inside, outside, and under the box too.”

“Although I have never worked as hard in a class in my entire life, I’ve also never learned as much as I did here either.”

“This class has been the most difficult and time consuming of any math class I’ve taken ... I did however learn a wealth of Mathematics.”

“This is one of the best instructors I have had. She challenged students in her course but was willing to help students accomplish the tasks. The assigned projects were difficult and almost overwhelming except that she would guide us if we needed assistance. The projects, her enthusiasm for the subject, and good, cheery personality inspired many of us to have a greater appreciation for math.”

Other student comments can be found in the supporting documentation.

## **Experiencing Mathematics in Other Disciplines**

I had the honor in 1999 of being admitted to Scholarship Kennesaw, a group of faculty who engaged in discussions of interdisciplinary teaching and research. In that group, I learned about the writing of Jorge Luis Borges and had the good fortune to meet Mr. Dewi Wilson and Dr. Judy Holzman. We decided to design and team-teach a course in which we would explore Mathematics, Philosophy, and Literature through the works of Borges. A description of the course is included in supporting documentation. Through Borges’ work, students did see Mathematics in a new light and learn a little about its history, its structure, its philosophy. One student wrote:

“Math is one subject area that I have no confidence in my ability to be successful mastering it. In my mind, you are either on the math side of the scale and have trouble with English, or you are on the English side of the scale and have trouble with math. Because of this concept, I am astonished that Borges seems to have been able to succeed in both arenas. His writing makes it seem he would have been just as comfortable to sit down and read a book on math as he would a book on poetry. His interest in infinity and other Mathematics concepts has forced me to take a new look at math. I have learned so much that I had never heard before such as Zeno’s paradoxes. (I found them quite interesting.) Also, I have been able to learn the history behind many of the principles and theories, which is something that is rarely taught to the students ... This class has somewhat helped me see that math is not something to be feared. It really is another way to express what is seen in the world.”

Thus began my interest in interdisciplinary team-teaching, as well as the benefits of viewing Mathematics from the perspective of other disciplines including music, popular culture, history, philosophy, and literature. Since then, I've developed and taught a freshman seminar entitled *The Myth, Magic, and Mystery of Mathematics:  $M^4$*  (KSU 1101), and this semester I'm teaching a graduate course entitled "MAD Math" *Mathematics in Music, Art, Drama, and Politics* (MAED 7900). I also had the honor to be chosen as the first faculty fellow for Scholarly Discourse Across Disciplines by KSU's Center for Excellence in Teaching and Learning (CETL). As faculty fellow, I led a week-long summer seminar for faculty entitled "Summer Symposium for the Integration of the Humanities, Arts, and Sciences." A description of the seminar is included in supporting documentation.

### **And Now What?**

In summary, my philosophy of teaching can now be characterized as follows:

- Engage the students very actively in doing and discussing Mathematics, maximize the time they spend thinking, talking, and writing about Mathematics.
- Listen to students' reasoning and questions, and try to help them correct their reasoning and answer questions for themselves and their peers.
- Challenge them to think about Mathematics as deeply as possible, promote understanding and reasoning as well as algorithmic prowess.
- Make sure assessments provide an opportunity to probe the level of students' understanding, not skill at mimicry.
- Provide a variety of ways to experience the history and philosophy of Mathematics as well as the appearance of Mathematics in other disciplines.

My commitment to teaching also requires that I continue to read, learn, explore, enjoy Mathematics, keep informed about research in the teaching of Mathematics, conduct research in the teaching of Mathematics, and constantly seek ways to improve my teaching. In supporting documentation I show a typical analysis of student evaluations and of pre- and post-test information; in this way, I reflect on past successes and failures and seek specific ways to improve students' learning. I routinely attend meetings and make presentations at the National Council of Teachers of Mathematics, the Association for Mathematics Teacher Educators, and the Mathematics Association of America. At this year's Joint Meetings of the Mathematics Association of America and the American Mathematical Society, for example, I attended workshops on the intersection of music and Mathematics, and the geometry of voting, both of which I've had opportunities to use in my classroom. I also presented a description of some courses we have developed at KSU for future middle grades and secondary mathematics teachers. This year, through participation in the Board of Regents Academy for Learning Through Performance Assessment and in seminars sponsored by KSU's CETL I've become interested in "learner-centered" teaching and assessment, and plan to join a CETL learning community for learner-centered teaching next fall as well as participate in leading a summer workshop for faculty on learner-centered assessment.

**CONDENSED CURRICULUM VITAE**  
**MARY L. GARNER**

**EDUCATION**

Doctor of Philosophy, Educational Studies, Emory University, 1998.  
Master of Science, Applied Mathematics, Georgia Institute of Technology, 1987.  
Bachelor of Science, Chemistry, University of Florida, 1975.

**ACADEMIC APPOINTMENTS**

Associate Professor of Mathematics and Mathematics Education, KSU (2004-present)  
Assistant Professor of Mathematics and Mathematics Education, KSU (1998-2004)

**HONORS AND AWARDS**

Honoree of the 2007 Outstanding Mathematics Education student, University Scholars Ceremony, KSU, 2007  
Recipient of the 2006 university-wide Distinguished Teaching Award, KSU  
Finalist for the 2005 university-wide Distinguished Teaching Award, KSU  
Nominated in 2006 for the Distinguished Advising Award of the College of Science and Mathematics, KSU  
Nominated in 2003, 2004 and 2005 for the Distinguished Teaching Award of the College of Science and Mathematics, KSU  
Honoree of student Joan Lanoie, 2005 WINGS program at KSU.  
Hooded 9 graduates of the M.Ed. program at KSU, 2003-2005.  
Recipient of the 2003 Distinguished Teaching Award of the College of Science and Mathematics, KSU.  
Honoree of the 2004 Outstanding Student in the Joint Enrollment Program, University Scholars Ceremony, KSU, 2004  
Selected to be the first Fellow in Scholarly Discourse Across Disciplines by the Center for Excellence in Teaching and Learning (CETL) at KSU, 2002-2003.  
Honoree of the 2002 Outstanding Student in the Joint Enrollment Program, University Scholars Ceremony, KSU, 2002  
Elected President of the Georgia Educational Research Association. Fall 1998 to Fall 2001.  
Dean's Teaching Fellow, Graduate School of Arts and Sciences, Emory University,  
Fellowship, Division of Educational Studies, Emory University, 1993-1997.  
Elected to Pi Mu Epsilon mathematics honor society, 1985.  
Elected to Phi Beta Kappa and Phi Kappa Phi honor societies, 1975.

**COURSES TAUGHT**

*Exploration of School Mathematics from An Advanced Perspective I and II* (MATH 3495 and 4495), *Linear Algebra* (MATH 3260), *Math Studies* (MAED 7716), *Set Theory* (MATH 7700), *Honors Seminar: How to Lie with Statistics* (HONORS 3000, co-taught with Dr. Virginia Watson), *An Interdisciplinary Course Linking Mathematics, Philosophy, And Literature: The Fictions Of Jorge Luis Borges* (HONORS 2290 or SPANISH 4490, Team-taught with Dr. Judy Holzman and Mr. Dewi Wilson), *The Myth, Magic, and Mystery of Mathematics:  $M^d$*  (KSU 1101 which is KSU's freshman seminar), *Discrete Modeling I* (MATH 3322), *Mathematical Systems* (MATH 3390), *The Portfolio* (EDUC 7797) (This is the capstone experience for the Master of

Education in Adolescent Education. It was taught with Dr. Marian Fox and Dr. Pam Cole), *Functions and Analytic Techniques* (MATH 7718), *Precalculus* (MATH 1113), *Calculus I* (MATH 1190), *Critical Content of ECE Math II: Rational Numbers* (MATH 3316), *Critical Content for ECE Math III: Geometry* (Math 3317), *Student Teaching* (MAED 4475), *Number Concepts for P-5 Teachers* (MATH 2242), *Discrete Mathematics for Teachers* (MATH 7712), *Geometry* (MATH 3395), *Mathematical Modeling* (MATH 1101).

### **COURSES DEVELOPED**

*Exploration of School Mathematics from An Advanced Perspective I and II* (MATH 3495 and 4495), *Math Studies* (MAED 7716), *Set Theory* (MATH 7700), *Honors Seminar: How to Lie with Statistics* (HONORS 3000, co-taught with Dr. Virginia Watson), *An Interdisciplinary Course Linking Mathematics, Philosophy, And Literature: The Fictions Of Jorge Luis Borges* (HONORS 2290, Team-taught with Dr. Judy Holzman and Mr. Dewi Wilson), *The Myth, Magic, and Mystery of Mathematics:  $M^4$*  (KSU 1101), *Mathematics in Music, Art, Drama, and Politic* (MAED 7900).

### **SELECTED PAPERS AND PRESENTATIONS RELATED TO TEACHING**

- Fox, M. & Garner, M. (2006, October). *You are not to Reason Why. Just Invert and Multiply*. Annual meeting of the Georgia Council of Teachers of Mathematics.
- Garner, M. & Derado, J. (2006, January). *The Good, the Bad, and the Ugly*. Joint meetings of the American Mathematical Society and the Mathematical Association of America.
- Garner, M. (2006, January). *The History and Nature of Mathematics in the Works of Jorge Luis Borges*. Joint meetings of the American Mathematical Society and the Mathematical Association of America.
- Garner, M. & Ferguson, B. (2005, April). *What Figure Comes Next? An Advanced Perspective on a Classic Problem*. Annual meeting of the National Council of Teachers of Mathematics.
- Garner, M. (2005, January). *Problem Analysis: An Assignment to Deepen Understanding of School Mathematics*. Joint meetings of the American Mathematical Society and the Mathematical Association of America.
- Garner, M. (2003, October). *The Story Of The First (And Hopefully Not The Last) Summer Symposium For The Integration Of The Humanities, Arts, And Sciences At Kennesaw State University*. Annual Conference of the Association for Integrative Studies.
- Usiskin, Z. & Garner, M. (2003, January). *A Mathematics Course to Deepen and Broaden Teachers' Understanding of High School Mathematics*. Annual Conference of the Association of Mathematics Teacher Educators.
- Garner, M., Clarke, M., Elliott, J. D., Smith, C., Fowler, A., & Wood, G. (October, 2002). *Diophantine Dizziness*. Annual conference of the Georgia Council of Teachers of Mathematics.
- Garner, M. (2002, January). *MAA Project NEXT Panel Discussion: Successful programs that integrate mathematics with other disciplines*. Invited participation. Joint Mathematics Meetings of the American Mathematical Society and the Mathematical Association of America.
- Garner, M., Powell, H., & Rowe, C. (2001, October). *Let's be Discrete. Discrete*

*Mathematics in the Middle Grades Classroom I and II.* Annual conference of the Georgia Council of Teachers of Mathematics.

### **SPECIAL PROJECTS**

- Leader, numerous workshops for mathematics education majors and practicing teachers planning to take the Praxis II test for secondary certification in mathematics or, more recently, the GACE examination.
- Organizer and presenter at numerous “Math Nights” (student and faculty get-togethers sponsored by the Department of Mathematics and Statistics).
- Presenter at numerous “Math Talks” (weekly seminar for students and faculty).
- Member, Committee for Design and Analysis of Placement Test in Mathematics for the Department of Mathematics and Statistics
- Member, Assessment Committee, Department of Mathematics and Statistics
- Interviewer, Governor’s Honors Program candidates at Marietta High School
- Participant, Board of Regents Academy for Learning Through Performance Standards and Assessment, 2006
- Member, State Committee for Writing the Georgia Performance Standards Framework for Mathematics – Grade 7, 2006
- Principal Investigator, Teacher Quality Grant 2007-2008 entitled “Using Literature to Promote Mathematical Understanding” with Edwards and Derado (\$45,367.59).
- Co-principal investigator, Teacher Quality Grant 2006-2007 entitled “Developing Materials for Georgia Performance Standards – High School Mathematics I” (\$49,583).
- Organizer, Math Day, 2006. (On November 21, 2006, seven faculty members from the Department of Mathematics and Statistics addressed approximately 90 students from Kennesaw Mountain High School about research, applications, and careers in math.)
- Member, University Assurance of Learning Committee
- Organizer and leader, KSU’s Center for Excellence in Teaching and Learning(CETL) Spring Symposium for the Integration of the Humanities, Arts, and Sciences; Spring 2004.
- Organizer and leader, KSU’s CETL Summer Symposium for the Integration of the Humanities, Arts, and Sciences; Summer 2003.
- Teacher, KSU Prefreshmen Experience Program 2004. (I gave the students a “taste” of college-level work in mathematics as part of their preparation for their upcoming college experience.)
- PRISM grant Summer 2005. A colleague and I set up a teaching experiment in a Paulding County summer school. The experiment consisted of coaching regular classroom teachers to employ the new Georgia Performance Standards.

### **ORGANIZATIONAL MEMBERSHIPS**

American Educational Research Association, Georgia Educational Research Association, Institute for Objective Measurement, National Council of Teachers of Mathematics, Georgia Council of Teachers of Mathematics, Association of Mathematics Teacher Educators, Mathematical Association of America, Association for Integrative Studies

## SUPPORTING DOCUMENTATION

### SAMPLE ASSESSMENTS

MATH 1113H: Precalculus Honors (for Joint Enrollment Students -- high school students who are taking courses at KSU. This was part of a KSU Learning Community in which the students were also taking a Political Science course.)

- Read the Preface, Introduction, and Chapter 1 of the book Political Numeracy, then answer the following questions in the form of a short essay:  
The author quotes Bertrand Russell on page 27: “Thus, mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true.” Why did the author include this quote? How is this view of mathematics relevant to the legal system? In what other way(s) does the author describe mathematics and its relationship to the legal system?

MATH 3260: Linear Algebra (for mathematics, computer science, and mathematics education majors)

- Why is the span  $\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix} \right\}$  a subspace?

MAED 7900 Mad Math

- Read the story “Death and the Compass” and answer the following questions:
  - a. Research briefly on the web “Zeno’s Paradox.” What is it and what does it have to do with the story?
  - b. How do numbers play a role in the story?
  - c. What geometrical shapes play a role in the story? How?

MATH 3495: Advanced Perspectives on School Mathematics I (for middle grades and secondary mathematics education majors)

- What is a “field” in mathematics, and what is the significance of the properties of a field for middle grades and secondary mathematics?
- Create a metaphor for a recursively defined function and explain how the metaphor is appropriate for the recursive form of a function in contrast with a closed form.. (In other words, a function in closed form is often described as a “machine” or “box” with an input slot and an output slot...So the closed form of a function can be described metaphorically as a “machine.” How could the recursive form of a function be described?)

### PORTION OF RUBRIC FOR TERM PROJECT

In MATH 3495:Advanced Perspectives on School Mathematics I for middle grades and secondary mathematics education majors, students take a word problem from the middle grades or secondary curriculum (approved by the instructor) and analyze that problem according to the guidelines below. The students are always quite proud of the finished product. Note that I’ve put the specific rubric for grading the first section and then just described the remaining sections of the project.

1. Approaches: Describe different ways of solving or representing the problem, including ways involving diagrams or pictures, technology, algebra, guess and check, arithmetic approach ... Always explain your reasoning and reflect on differences or similarities between approaches.

- 0 Section is missing. Approaches are incomplete and/or incorrect and/or inconsistent.
- 5 Only a few correct approaches are provided. Little discussion is provided.
- 10 At least three correct approaches are provided (including approaches involving technology and algebra); however, there is little discussion (explanation, comparison, reflection) of the approaches and/or some interesting approaches were omitted.
- 15 At least four correct approaches are provided (including approaches involving technology and algebra) and discussed to some extent, but it is not clear that the student understood the problem deeply and can appreciate different approaches. The student provides procedural solutions but it is not clear that the student understood the procedures conceptually.
- 20-25 At least four correct approaches as well as at least one wrong approach are provided (including approaches involving technology and algebra) and discussed thoroughly. It is clear that the student deeply understands the problem and the conceptual underpinnings of each approach. The student demonstrates an understanding of how solutions and representations are connected. Any algorithms used are explained conceptually.
2. Generalization: Generalize the problem and its solution. Describe the characteristics of the solution set.
  3. Analysis of Generalization using Functions: Using your generalization, analyze the relationships between quantities in the problem.
  4. Extension: Extend the problem and create a new problem so that a deeper understanding or more mathematics is required to solve the problem
  5. Concepts. General overview of concepts underlying the problem and then in-depth focus on one particular concept including exploration of the definitions of the concept, properties, representations. Here the student should explore tests and articles from *Mathematics Teacher* and *Mathematics Teaching in the Middle School*
  6. Connections. Discussion of connections with other problems in the curriculum, including applications, extensions, etc. In-depth exploration of one particular connection. Again, student should explore middle grades and secondary texts, the Frameworks for the Georgia Performance Standards, Intermath, and articles from *Mathematics Teacher* and *Mathematics Teaching in the Middle School*.
  7. History. One particular aspect of the history of the concept and/or problem is explored.

**COMMENTS FROM FACULTY AND FORMER STUDENTS:**

*Dr. Victor Kane, Chairman of the Department of Mathematics and Statistics (letter of nomination for Distinguished Teaching Award at Kennesaw State University) 2006:*

“Mary is an exceptional teacher of mathematics courses at all levels from General Education courses to Graduate courses. She is well known as a challenging instructor who actively engages students and emphasizes understanding of mathematics. This quality holds true in courses such as Calculus and Discrete Mathematics but most especially in the courses for pre-service teachers. .. Whether she is teaching math for Early Childhood Education majors or math for Math and Math Education majors or math for Graduate students, Dr. Mary Garner is one of the most passionate, hard-working teachers around. She always thinks a lot about what she is doing. She always requires her students to think. Sometimes that is their complaint (which only makes the rest of us laugh and applaud her more).”

*Dr. Nita Paris Graduate Program Coordinator for Department of Secondary and Middle Grades Education (letter) July 2003:*

“I am writing at this time because I have become keenly aware of your outstanding contributions to our program. Specifically, I am working with a large group of graduate students this summer who are finalizing their portfolios for graduation. Nearly every mathematics candidate has identified your class as being the most challenging one that they took at Kennesaw AND the one in which they learned the most about mathematics and problem analysis. Your high expectations and problem-based teaching strategies challenge our candidates to stretch themselves. I wanted you to know that in the end, they recognize and appreciate the challenges they faced in your class. Many of them have said that your class changed the way they look at mathematical problems and it has changed the way they will teach mathematics as well.”

*Some anonymous comments from faculty who participated in the CETL Summer Symposium for the Integration of the Humanities, Arts, and Sciences:*

“Helped me to see the flexibility and creativity of math. Opened many (too many really) exciting ideas for interdisciplinary teaching.”

“I am particularly interested to explore further connections between mathematics and other fields.”

### **COMMENTS ON STUDENT EVALUATIONS**

*MATH 3495 Spring 2006:*

“This has been a great experience for me and has truly challenged me to look at mathematics differently.”

“This class required a lot of self exploration which has really helped me grow as a math student. With each assignment, I began to question more ideas, and I would then search for those answers on my own.”

“Dr. Garner is the single best professor I’ve had at KSU. When I schedule my courses, I generally try to do it around her schedule.”

“I also would like to add that Dr. Garner’s love of teaching, plus her concern for her students’ success has been a marvelous influence on me. It has been a pleasure to attend each and every class meeting.”

*MATH 7700 Summer 2006:*

“This has been a challenging class for me. Dr. Garner was able to explain some very complex concepts in terms that I was able to understand. I think the readings and term paper were great complements to the math topics. I like the idea of studying the history of mathematics and how it relates to class topics. I hope to be able to do this when I teach mathematics.”

“I thoroughly enjoyed this class! Dr. Garner was definitely a guide in our education rather than a lecturer. We were able to learn the material with a deep understanding in a short amount of time. All of our class time was fully maximized. I would love to have another class with her.”

“Wonderful experience. Dr. G really expects you to do your best and does everything to help you get there.”

*MATH 4495 Fall 2006:*

“Dr. Garner is still one of the best professors I have ever had. I learn more from her and her comments on my work and tests than I do in most entire classes.”

“I have gained a deeper understanding of the material by letting us to the work rather than everything being spoon fed. The history and connections were great! I came away from this class

with the knowledge that I will be able to teach the class with confidence. I wish there were more courses designed like this one.”

MATH 7716 Summer 2004:

“I thoroughly enjoyed the class. I had to work harder than I can remember doing, but I learned a ton. I think I have a better conceptual understanding of the math concepts we discussed. I think I will be a better teacher now.”

“Dr. Garner has modeled exactly (sic) what the new performance standards are mandating middle school teachers to do – inquiry based investigations, students communicating, understanding and extending concepts.”

“This course has forced me to stretch more than any other class I have ever taken! Dr. Garner is great. She is patient and so willing to help when there are questions – and there always are!

Thank you Dr. Garner for making me think!”

MATH 7718 Summer 2004:

“Dr. Garner models NCTM principles. She promotes communication and problem solving. She requires multiple representations and connections. Her enthusiasm for the subject is contagious. She brings out the best in her students. She is available, approachable, and helpful.”

“Dr. Garner has, without a doubt, the best perspective for instructing 6-12 teachers. Her content expectations, wrapped around practical classroom applications, makes for a meaningful class. She rocks!”

“Dr. Garner’s joy and excitement towards the material and her students was very apparent. Through her teaching methods she continues to be our example of what an extraordinary teacher should be.”

MATH 3495 FALL 2004:

“Wow, what a tough class – but, one of the best I have ever taken at KSU. I was really challenged to stretch farther than I ever thought I could.”

“Although I have never worked as hard in a class in my entire life, I’ve also never learned as much as I did here either.”

“This was the most beneficial course I have taken at KSU. Dr. Garner’s role as facilitator (not teacher) was instrumental in not only my gaining knowledge, but retaining it and using it. The problems that we analyzed were mesmerizing. I found myself unable to stop working on them until I truly understood them! This was by far the best experience of my academic career!”

MATH 3495 SPRING 2004:

“Dr. Mary Garner is bar none (sic) the best professor of Mathematics I’ve ever had – and I’ve had many (with a Masters in Engineering). She is tough, she mentors well, and she makes you work!! I loved every minute of this class and only wish there was a 3495 part II. If she offered it in the summer, when I’m a teacher, I would come back and audit the class. I can’t think of anything to improve – just keep Dr. Garner, and this University will keep putting out better Math teachers!”

“This course was one of the most challenging courses I have ever taken. It made me think of math in an entirely new way.”

“This is an important course in preparation for teaching ... I appreciate Dr. Garner’s willingness to let students have an open discussion. Very few professors would feel comfortable with this style.”

“Dr. Garner held the bar high.”

## SAMPLE ANALYSIS OF STUDENT EVALUATIONS and PRE&POST-TEST

### Math 3322 Spring and Fall 2005

Components of Course	Praise		Suggestions for Improvement	
	Spring	Fall	Spring	Fall
Instructor, Instructor's Style of teaching	11	9		
Class discussions	7	7		3*
WEBCT	4	6		
Homework collected	3	2		
Topics of course (difficulty of proof ...)	2		2	
Group work	2			
Text		1	6	5
Supplementary materials	4	1		
Tests (and practice tests)	3	6		1
Extra credit	1	2		
Outside availability and help	2	3		1

Evaluations: Spring 17, Fall 16

After Spring of 2005, one student sent me an email: "I've never taken a more difficult class (conceptually speaking), I've also never enjoyed one quite so much. The dynamics of that class made me always eager to attend."

\*In this particular class was a student who would sometimes ask inappropriate questions or questions that were difficult to understand and often disrupted the class. I had trouble controlling his interjections.

Pre-test and Post-test results

Problem involving:	Spring 2005 (15 students)		Fall 2005 (20 students)	
	Pre-test correct	Post-test correct	Pre-test correct	Post-test correct
Combinations	3	15	1	17
Permutations	5	15	1	17
Probability (dice)	3	10	2	16
Power set	1	10	1	
Factorials	9		4	
Function (definition)	4		3	
Graph Theory	2		1	
Proof by Mathematical Induction	4	13	0	13

Spring 2005: 8 students took pretest but no final exam. 3 took the final and no pretest. 15 total to compare.

Fall 2005: 2 math final and no pretest. 2 pre-test and no final. 20 total to compare.

## **SELECTIONS FROM A SYLLABUS:**

HONORS 2290: An Interdisciplinary Course Linking Mathematics, Philosophy, and Literature:  
THE FICTIONS OF JORGE LUIS BORGES

### **Course Description:**

Jorge Luis Borges is the author who has had the most significant influence on Latin American literature in the last forty years. He has also inspired many recent developments in North American writing. His dense but extremely rewarding works give off sparks in many directions, including mathematics and philosophy. In this course we will study the interplay of literature, mathematics, and philosophy in Borges' writings and note how his treatment of them affected the literature of Latin America and today's world in general.

We feel that the ideal approach to Borges is interdisciplinary. A team-taught course brings together expertise in several areas. We also wish to bring together students from diverse disciplines to discuss Borges' writings in a seminar environment, which will be designed for student participation, orally and in writing.

No student is expected to enter the class already understanding the literary, mathematical, and philosophical contexts. The course readings will include all three aspects, and the instructors will provide essential background.

Each teacher brings her/his own knowledge and perspective to both the educational and the scholarly work. **Dr. Judy Holzman** will introduce the cultural context in which Borges wrote and will demonstrate how his writings have contributed to and influenced contemporary Latin American literature. She will show how Borges and his disciples changed the traditional fictional mode of Latin American literature and developed a new "metafiction."

One of Borges' accomplishments was his ability to turn philosophical topics into literature. **Mr. Dewi Wilson** will focus on this aspect of his writing. He will contribute to the course his thoughts on Borges' use of philosophy (especially metaphysics) and mysticism.

Mathematics completes our triple study. Many of Borges' works are metaphors for mathematical ideas, and **Dr. Mary Garner** will lead the study of the mathematical concepts in Borges' work. She is interested in the ability of literature and philosophy to explain mathematical constructs. She will touch on the way Borges enjoys stepping over the fine line between mathematics and metaphysics and back again. Dr. Garner will highlight two of Borges' favorite concepts, infinity and the infinitesimal, from the perspectives of mathematics, physics, and metaphysics.

### **Course Requirements:**

**Class participation:** Your participation in each seminar is critical. You must complete all readings and consider all pre-reading and post-reading questions to be ready to participate in class discussions. At the end of the semester, each of the three instructors will assign your class participation 1 to 20 points depending on their subjective judgment of the quality of your participation. These scores will be averaged and added to your total score.

**Reflections:** You'll be required to complete 10 reflection papers during the semester. These papers will be approximately 4 pages in length (typed, double spaced) and graded according to a rubric that you will be able to access on WEBCT. Some of the reflections will be on themes of your choosing, others will be responses to questions the instructors pose during the seminar. Your reflections must relate to class discussions and readings.

**Project:** A term project must be completed. We will provide guidelines for the project by the end of September.

# Summer

## Symposium for the Integration of the Humanities, Arts, and Sciences



August 4 – 8, 2003

Monday – Friday, 8:30 AM to 1 PM

Kennesaw State University

Center for Excellence in Teaching and Learning



A Unit of the Office of  
Academic Affairs

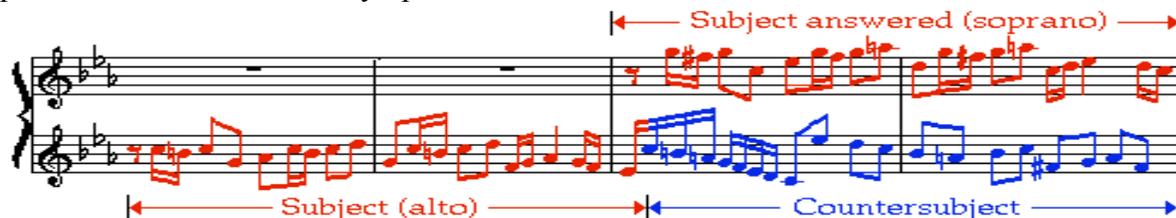
The summer symposium will include selections from the book *Godel, Escher, And Bach: The Eternal Golden Braid. A Metaphorical Fugue On Minds And Machines In The Spirit Of Lewis Carroll*, by Douglas R. Hofstadter, as well as works by Bach and Escher. Books, CD's, and other materials will be supplied to participants free of charge. Continental breakfast and lunch will also be provided.

The purpose of the symposium is to:

- Bring faculty members from different disciplines together for a sustained conversation around a work that fosters an integrative view of the humanities, sciences, and arts.
- Enable faculty to interact with disciplines outside their own through participation in a series of integrative activities.
- Provide faculty with profound connections across disciplines that could be taken into their own classrooms or could be developed into courses.
- Establish a foundation and direction for further interdisciplinary collaboration.

Coordinator is Mary Garner, Assistant Professor of Mathematics and CETL Fellow. The faculty leaders of the symposium are: Josip Derado, Assistant Professor of Mathematics; Ricky Garner, Assistant Professor of Art Education; Barbara Hammond, Assistant Professor of Music Education; Robert Hill, Professor of English, and Todd Harper, Assistant Professor of English.

To sign up for the symposium, please email Mary Garner at [mgarner@kennesaw.edu](mailto:mgarner@kennesaw.edu). All participants will be expected to take an active part in the symposium. Participants will also be invited to contribute to a collection of essays on interdisciplinary teaching and learning to be published as a result of the symposium.



Please join us for what promises to be a stimulating and interesting week.