



EAST GEORGIA STATE COLLEGE
131 College Circle
Swainsboro, Georgia 30401
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*From the Desk of Dr. Tim Goodman
Vice President for Academic Affairs
East Georgia State College*

May 23, 2012

It is my distinct pleasure to write this letter of recommendation for Dr. Paul Cerpovicz to receive the Regents' Teaching Excellence Award. In my capacity as Vice President for Academic Affairs I have had opportunity to observe Dr. Cerpovicz since he became a full-time faculty member in 2002. Also, we share the same discipline, chemistry. Thus, I feel very confident in giving this recommendation.

I found Dr. Cerpovicz to be very intelligent with a strong interest in his discipline and theory and pedagogy on how to best present his subject. Dr. Cerpovicz is very technology literate, necessary in this day and time in education. He uses a variety of teaching techniques and media very effectively. His strength lies in his ability to communicate well with students in classes and out of classes.

Dr. Cerpovicz develops many instructional materials for delivery at a distance and supplemental materials in face-to-face classes. Our students are generally first-generation students and many belong to groups that make them high-risk for dropping out. Thus, they need materials that they can understand and utilize fully. He is very innovative with the materials he has produced for classes and also in the assignments he has developed. He writes his own labs and lab instructions, not only to make them more understandable by our students, but to assure that we efficiently and effectively use our local resources. His student evaluations of teaching are strong and draw attention to those special materials he has developed. He has strong teaching evaluations from his Division Chair. His strengths are across the board: enthusiastic presentations, stimulation of thinking, understanding and caring about students, and promptness of returning assignments. Dr. Cerpovicz is deeply involved in assessing the performance outcomes of his students and regularly reports the results of assessments of effectiveness.

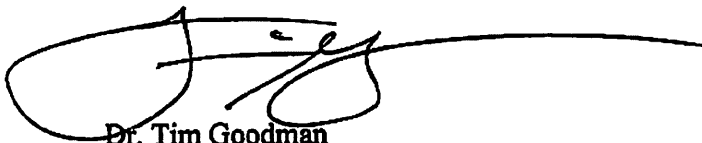
Dr. Cerpovicz' enthusiasm for chemistry, education, and quality instruction is contagious. We see it in his students and in the faculty with whom he interacts. It is apparent on his student evaluations and in his reputation with faculty. Students in his classes talk about how he cares about students and their issues and how he takes time with them. They talk

about the experiences they gain from his classes and how those experiences will be valuable later on in their academic career.

A majority of Dr. Cerpovicz' students are freshmen and are in the mode in which they feel they must return to the instructor what the instructor gives them. It is hard to get the students to think out-of-the-box. Dr. Cerpovicz' courses are structured to provide those opportunities to look beyond the confines of the course and they appreciate his willingness to give them the opportunity to be creative.

With his background I feel he is a valuable asset to East Georgia State College and it is without hesitation that I recommend Dr. Paul Cerpovicz for the Regents' Teaching Excellence Award.

Professionally yours,

A handwritten signature in black ink, appearing to read 'Tim Goodman', with a long horizontal line extending to the right.

Dr. Tim Goodman
Vice President for Academic Affairs
East Georgia State College



Division of Natural Science and Mathematics
131 College Circle
Swainsboro, Georgia 30401-2699
University System of Georgia

Tel: (478) 289-2068
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May 22, 2012

Dr. Linda Noble
Associate Vice Chancellor for Faculty Affairs
University System of Georgia
270 Washington Street, SW
Atlanta, GA 30334-1450

Dr. Noble:

It is my distinct pleasure to strongly support the nomination of Dr. Paul Cerpovicz for consideration for the Regents' Teaching Excellence Award. Dr. Cerpovicz is an Associate Professor of Chemistry and has taught chemistry at East Georgia College for ten years. During his tenure at East Georgia College Dr. Cerpovicz has consistently and with great enthusiasm combined his superb scientific knowledge, his commitment to excellent teaching, his desire to strive for continuous assessment and improvement, and his dedication to student learning to become a role model for the kind of teacher that the University System of Georgia desires to attract and retain. In a nutshell, the following examples support East Georgia College's nomination of Dr. Cerpovicz for the Teaching Excellence Award. Dr. Cerpovicz

- Is a gifted teacher and is exemplary in his use of multiple teaching methods in helping his students attain their learning goals. These include guided inquiry, critical thinking activities, student research projects, as well as traditional lectures.
- Is a quick adopter of new technologies that enhance his teaching and assessment of student learning as evidenced by his ability to produce his own capsule videos to illustrate tough scientific concepts and by his use of clickers in the classroom to assess how students are progressing.
- Enhances student learning in a wider sense by directing and organizing regional Science Olympiads at East Georgia College in which students learn to utilize their scientific knowledge by competing in stimulating scientific activities.
- Impresses me by his success in helping students with a wide range of preparation attain success in his classes.
- Promotes student learning in the local community by organizing exciting scientific demonstrations and supporting local school districts on Science Nights.

In closing, it is with sincere conviction that I enthusiastically recommend that Dr. Paul Cerpovicz be selected as a recipient of the Regents' Teaching Excellence Award.

Sincerely,

A handwritten signature in cursive script that reads "Robert J. Brown, Jr.".

Dr. Robert J. Brown, Jr.
Chair - Math and Science Division

It is with great pleasure that I write this letter of support for Dr. Paul Cerpovicz for the Teaching Excellence Award sponsored by the University of Georgia. I had the pleasure of having Dr. Cerpovicz for Principles of Chemistry I and he is one of the best professors I have come across in my collegiate endeavors.

I made the decision two years ago to register for a few classes in order to return to school for my Master's Degree. Before taking Dr. Cerpovicz's class, I had heard that he was a hard but fair teacher. At 28-years-old with a full-time career, I was a little nervous about taking a Chemistry course, so I went to Dr. Cerpovicz before the semester began to address my concerns. He was very understanding, and encouraged me to come see him whenever I needed help or further explanation of our class lectures. Our class really bonded under his instruction and we all enjoyed his teaching style. While his Chemistry class was not easy, he was readily available to his students after class and gave us ample aid and assignments to help with our understanding the material. He spent the time to thoroughly explain the material and was able to accommodate the different levels of understanding in the class. Throughout the semester, I was able to get a feeling of his true passion for teaching. He came to class excited to teach us about Chemistry and went out of his way to make the lessons enjoyable and educational.

Dr. Cerpovicz is a quiet, soft-spoken man but sincerely kind and considerate, especially of his students. Even though I only had him for one semester, he always takes the time to speak to me in passing and ask how my classes are going and how my career goals are coming along. I have recently registered to take his Organic Chemistry I class and I am so happy to have him again for a professor. Dr. Cerpovicz deserves to be recognized for his commitment to the teaching profession and I am happy that I have the honor of nominating him for this much deserved award.

Sincerely,

A handwritten signature in black ink that reads "Mary W. Bennett, ATC". The signature is written in a cursive, flowing style.

Mary W. Bennett, ATC

505 Mall Blvd. Apt 213
Savannah, Ga. 31406

April 30, 2012

Dr. Linda Noble
Associate Vice Chancellor for Faculty Affairs
University System of Georgia
270 Washington Street, SW
Atlanta, GA 30334-1450

Dear Selection Committee:

I am writing you on behalf of Dr. Paul Cerpovicz, East Georgia College's Chemistry Professor. Dr. Cerpovicz is an excellent teacher; in fact, he is the best teacher at EGC in my opinion. The reason that he is such a wonderful chemistry teacher is because he truly loves what he teaches. Most students would say their favorite teacher is the easiest teacher, but my opinion of Dr. Cerpovicz does not fall into this category; his classes were challenging. He made you learn the material and work for your grade.

I signed up for Dr. Cerpovicz's Principles of Chemistry I class for the Spring Semester of 2010. I was very nervous about this class, but I soon found out that chemistry was an amazing subject. He taught me to love chemistry and encouraged me to pursue a degree in chemistry. Recently, he helped me get accepted into pharmacy school, a chemistry based profession.

His classes were serious and attendance was important. Dr. Cerpovicz was very detailed in his lectures and put them in simple terms so that each and every student could understand the concept. He made sure that we knew and understood the material by explaining the concept as many times as we needed it. He had office hours for any questions a student might have and was available by email and telephone.

He also made worksheets for us to complete for extra help. The best part about these worksheets was that when you were finished you could watch the answer key worksheet video. Dr. Cerpovicz made screen videos of him actually working out the problems so that we would not only get the right answers but could see exactly step-by-step on how to do the problem. He would also do this with our test keys.

What I liked most about his classes was the fact that he did not just read through a store bought slide show, but took the time to create his own PowerPoint's. His PowerPoint's consisted of detailed lessons and great pictures, but the best part was that they were purposely incomplete. By incomplete, I mean that you could not just print out the slides and be ready to study, but you had to pay attention to the lecture to be able to fill in the blanks. He would create slides with blanks and when he came to that slide in his lesson, his copy on the overhead would have the answers. This type of PowerPoint encouraged students to come to class and listen to be able to complete the notes. Also, Dr. Cerpovicz made class fun; he demonstrated different reactions and chemistry experiments in class to demonstrate a lesson. Dr. Cerpovicz definitely knows what he teaches and shares the thrill of chemistry with his students. He is the

type of teacher who knows the answers to the various questions asked without having to look at a textbook.

Another important teaching method that Dr. Cerpovicz did in each of his classes was an online discussion. There would be particular articles related to the current lessons in class posted on the school's website. Each student had to read the articles and comment on a class forum. The discussion was a percentage of our grade so it encouraged us to read the articles and discuss it with our classmates.

When it came to laboratory class, he was always there to answer a question or to help you with an experiment. I thoroughly enjoyed lab and looked forward to the different experiments that were lined up for us to complete.

I always heard students talk about how you could "never learn Dr. Cerpovicz tests." His tests were very challenging. They were not the same type of test each time that you could learn what type of questions the teacher liked to ask; you had to know it all. You could not halfway memorize the material and expect to choose between answers on a Multiple Choice test. He would have a mixture of ways to ask questions such as fill-in-the-blank, multiple choice, essay, and matching. You had to study days prior to be fully prepared to pass it. This type of testing made you dig in the book and pay extra attention in class.

I believe that Dr. Paul Cerpovicz deserves a Teaching Excellence Award to let him know how great of a professor he is. Without Dr. Cerpovicz, I probably would not know as much as I know about chemistry and would not have the respect and love for it that I do today.

Sincerely,

A handwritten signature in black ink, appearing to read "Charity K. Holt". The signature is fluid and cursive, with a large initial "C" and a stylized "H".

Charity K. Holt

Condensed Curriculum Vitae

Paul F. Cerpovicz

Current Position:

Associate Professor of Chemistry
East Georgia College, Division of Math and Science
Tel: (478) 289-2071, E-mail: cerpovicz@ega.edu

Education:

- Ph.D. in Biochemistry, 1991, Kansas State University, Manhattan, Kansas.
- B.S. in Biology, 1986, Westfield State College, Westfield, Massachusetts.

Postdoctoral Experience:

- Postdoctoral Studies in Biology, July 1993 - July 1995, Kansas State University.
- Postdoctoral Studies in Biochemistry, July 1991 - June 1993, Kansas State University.

Professional Education Certificate:

- State of Georgia Teaching Certificate, General Science Secondary Education, July 2002.

Teaching Positions and Courses Taught:

- **East Georgia College (2002 - present)**
Principles of Chemistry I and II; Organic Chemistry I and II; Developmental Math; Integrated Science; Physical Science; Problem Solving I; Science in Society
- **Emanuel County Institute (2000 - 2002)**
Chemistry; Physics; Physical Science; Principles of Technology; Biology
- **Georgia Southern University (1995 - 2000)**
Biochemistry I, II, and III; General Chemistry I and II; Introduction to General Chemistry; Nutritional Biochemistry; Introduction to General and Organic Chemistry; Chemical Research Experience; Introduction to Chemical Research Methods

Courses Developed:

- Molecular Biology lab for Biochemistry; Integrated Science; Physical Science; Science in Society; Biochemistry; Advanced Biochemistry

Awards and Memberships:

- CRC Press Freshman Chemistry Achievement Award, 1983.
- Wesley Foundation Scholar Program in Cancer Research, the Center for Basic Cancer Research, Division of Biology, Kansas State University, 1991-1993.
- National Science Teachers Association, 1996 - 2001.
- The American Chemical Society, 1995 - present.
- Georgia Academy of Sciences, 1995 - 2000, 2002 - present.
- Kiwanis Club - Swainsboro, Georgia, 2003 - present.

Research Experience:

- Development of new student laboratories.
- Development of web-based chemistry tutorials.
- Purification and characterization of proteins, enzymes, DNA, and small molecules.
- Molecular biology techniques (DNA sequencing, PCR, recombinant proteins).
- Handling and care of small animals.

Professional Service:

- National Chemistry Week Coordinator for the Coastal Empire Section of the American Chemical Society, 1996 - 1999.
- Reviewer for the *Concepts in Science Lab Book*, John Wiley and Sons, 11/2010.

Institutional Service:

- Four-year Biology Program Development Committee, 2010 - present.
- Chemistry Academic Advisory Committee member, 2002 - present.
(Chair from 2008 - 2009, Secretary from 2007 - 2008)
- Faculty Advisor, 2002 - present.
- EGC Science Olympiad Tournament Director (2007-2008, 2008-2009, 2011-2012)
- East Georgia College Post Secondary Enrichment Program (PREP) participant
- East Georgia College K2 Initiative participant
- Faculty Association member, 2006 - present.
(Served as President from 2008 - 2009, and as Secretary from 2006 - 2007)
- Circle K Club Advisor, 2002 - 2007.
- Earth Club Advisor, 2002 - 2005.
- Academic Policies Committee, 2002 - 2011.
- Faculty Staff Development Committee, 2002 - present.
- SACS Teaching Effectiveness Committee co-chair, 2008 - 2012.
- SACS Assessment Committee, 2009 - 2012.
- Conflict Resolution Committee, 2003 - present.
- Tenure and Promotion Committee, 2009 - 2011
(Chair from 2010 - 2011)
- Program Review Committee, 2005 - 2006.
- Academic Appeals Committee, 2002 - 2003.
- Institutional Biohazards Committee chair, 2002 - 2003.
- Search committees for Math/Science Chair, Biology, Physics.

Community Service:

- Georgia Youth Science & Technology Center "Family Science Night" participant 2003 - present.
- Numerous science shows for elementary and middle school classes.
- Director of the Annual Pine Tree Breeze Charity Bicycle Ride, 2003 - 2010.
- Swainsboro Kiwanis Club member, 2003 - present.
- Developed and organized public mall "Chemistry Fun Days" for National Chemistry Week in Statesboro, GA, and Brunswick, GA, 1995 - 1999.

Professional Development Related to Teaching:

- Science Olympiad Tournament Directors meeting, Macon, GA, 2007, 2008, 2011.
- ISCI Professional Learning Conference workshop, Macon State, Macon, GA, 2007.
- 2YC3 meeting participant, Georgia Perimeter College, Dunwoody, GA, 2007.
- PRISM Professional Learning Conference participant, Macon State, Macon, GA, 2007.
- Partnership for Reform in Science and Mathematics (PRISM) workshop, 2004.
- Multi-Initiative Dissemination (MID) workshop participant, Emory University, 2002.

Grants Received (15 from 1995 - 2010):

- Development of Instruction (4); Public Outreach (2); Travel (5); Research/Technology (4).
- 100 % application success rate; total funding: \$72,253.
- Additional details available upon request.

Poster and Oral Presentations (20 from 1988 - 2011):

- Undergraduate research under my direction (7); Curriculum Development (5); Personal Research (8)
- Additional details available upon request.

Peer-Reviewed Publications (7 from 1991 - 2011):

- Undergraduate research under my direction (3)
- Curriculum Development (1)
- Personal Research (3)
- Additional details available upon request.

References:

Robert Brown, Jr.
Professor and Chair
Division of Science and Mathematics
East Georgia College
Swainsboro, Georgia 30401
478-289-2068, bbrown@ega.edu

Tim Goodman, Ph.D.
Vice President of Academic Affairs
East Georgia College
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(478) 289-2034, goodman@ega.edu

Julia Celebi
Magnolia Springs Georgia Youth Science
and Technology Center Coordinator
East Georgia College
Swainsboro, Georgia 30401
(478) 289-2094, GYSTC@ega.edu

Reflective Statement

I am currently a tenured Associate Professor of Chemistry at East Georgia College, in Swainsboro, Georgia. My full-time teaching career began in 1995 as a faculty member in the chemistry department of Georgia Southern University (1995-2000). After this appointment, I completed two years of teaching chemistry, physics, principles of technology, and biology at a local high school (2000-2002). During this same period, I enrolled in education classes at Georgia Southern University and earned my Teaching Certificate for the State of Georgia in General Science Secondary Education in 2002. In August of 2002, I had the privilege of joining the faculty at East Georgia College.

Since joining East Georgia College, my academic duties have included teaching *Principles of Chemistry I* (CHEM 1211), *Principles of Chemistry II* (CHEM 1212), *Organic Chemistry I* (CHEM 2411), *Organic Chemistry II* (CHEM 2412), and an undergraduate research course *Problem Solving* (PROB 1101). In addition, I have developed and taught *Integrated Science* (ISCI 1101), a *Physical Science* course for elementary education majors (ISCI 1102), and a one-credit hour seminar course entitled *Science in Society* (SCIE 1101). Currently, I am developing two additional lecture/laboratory courses, *Biochemistry*, and *Advanced Biochemistry*, which will be offered as part of East Georgia College's new four-year biology program. In addition, I am continuously writing or updating laboratory activities for my chemistry courses in an effort to give students a better understanding of the material and concepts being covered.

Over the years, I have strived to teach all of my classes in a clear, thorough, and hopefully interesting manner for the students. To help with this, I have made extensive use of GaView Vista to supplement my classes, using it to provide students with outlines of class notes, laboratory activities, pre-laboratory assignments, discussion topics, practice sheets, video tutorials, practice exams, answer keys, and a continuous update of the students' grades. In addition, I have converted the majority of the class notes for each of my courses to a PowerPoint format. Most students tend to find this format more visually appealing, and it allows me the flexibility to include graphics and video clips to help enhance the lectures. Also, by providing students with abbreviated outlines of the notes ahead of time, the students can focus more on the lectures and discussions taking place during class. Since 2007, I have "experimented" with guided-inquiry based activities, in the form of both in-class assignments and as homework, as well as on-line tutorial-based homework systems that are linked to the class textbook - all in an effort to help the students be more successful in their respective classes. In fall 2008, I began using a classroom response system (clickers) in CHEM 1211 and CHEM 1212 to better assess how well students are grasping the material being discussed. Whenever possible, I make use of classroom demonstrations of chemical and physical principles to help students better appreciate and understand the concepts being covered in class.

I feel that an important part of teaching chemistry (or any topic) is to show how the subject matter is important to everyday life. The way this can be done varies from class to class and from student to student. While students who major in chemistry have an inherent interest in the subject, non-majors who take general chemistry to satisfy their core requirement often ask, "Why is this class important to me?" or "When will I ever need chemistry in my life?" I counter these questions by pointing out that everything they do in life involves chemistry in some way. At some point, many of them may need to make decisions about testing well water, conducting genetic tests on their newborn son or daughter, or voting to support funding for a particular scientific endeavor. While they may never know all of the details about the science involved in these activities (Few of us ever do!),

having a basic understanding and appreciation for chemistry, as well as its limitations, will help them to ask better questions and make more informed decisions. I also mention that there is much more to a chemistry class than just learning a bunch of facts about the subject. Chemistry is a very structured and analytical science that requires careful observations and the clear reporting of your findings. Taking chemistry gives students a great opportunity to enhance their reading, writing, problem-solving, and critical-thinking skills - all of which are valuable to master for whichever career path a student chooses to follow.

To help avoid the inevitable monotony with lecturing, I try to supplement lectures with appropriate hands-on activities, demonstrations, analogies, group problem-solving activities, and humor (as bad as mine usually is). For example, in my general chemistry classes I have built a lecture on the chemical and physical changes and properties of matter based on the burning of a magnesium ribbon. I often ask for student volunteers to come up and do the demonstration (Complete with safety goggles!) which produces a spectacular white hot flame. At other times, student volunteers have used liquid nitrogen to demonstrate gas laws and the intermolecular forces that hold all matter together. Activities such as these are not only entertaining and informative, but they also get students involved in the learning process, and help focus their attention on the concepts being covered.

An important goal in any science class is the development of good problem-solving skills. These typically require a great deal of practice and, after going through examples on the board, I often give the students a problem to try on their own or in small groups. As they work the problem I am able to walk around the class, look over their shoulders, answer questions, and offer suggestions when needed. This activity gives me an idea of how well the class is grasping the concepts being taught and indicates areas that need more clarification on my part. As an extension of this, I have recently started using "clickers" to anonymously assess how well students are understanding a particular topic. I also find that using analogies helps students relate to unfamiliar chemical concepts. One that I find particularly effective is the relationship between the mole, a basic counting unit in chemistry, and the extremely small size of atoms and molecules:

*"The counting unit used most often by chemists is the mole, which is 6.02×10^{23} particles of whatever you are referring to. Imagine if you had one mole of dollar bills (6.02×10^{23} dollars). You could spend one billion dollars every second for seventy years and only spend 0.0004% of all your money! A mole is a HUGE number! Now, in my hand I am holding 1 mole of sugar molecules. Imagine how **small** these molecules must be!"*

Demonstrations and analogies such as these help students to visualize the science they are studying and appear to be well appreciated by the majority of students. Although these activities take up class time, I feel that if they emphasize the topic being discussed and help peak the students' interest, they are well worth the time involved.

Another important aspect of teaching in my discipline involves undergraduate research. Although few students take the opportunity to be involved in a research project, those that do often find it very rewarding. Working on an independent research project provides students with the opportunity to expand on the concepts they learned in previous classes and fine-tune their laboratory and analytical thinking skills. It also exposes them to what things are like in the "real world." Traditional laboratory exercises are excellent for learning the skills and techniques necessary for succeeding in chemistry but, since they are typically designed to work and produce a definite outcome, they do not give students a good feel for pure, independent research. It is important for

students to realize that most of the experiments performed by scientists either do not succeed or go on to produce very unexpected and exciting results. By reporting their findings in a detailed, written laboratory report, the students gain experience in searching the scientific literature and properly expressing their findings and conclusions on paper. These are valuable skills to have in any discipline.

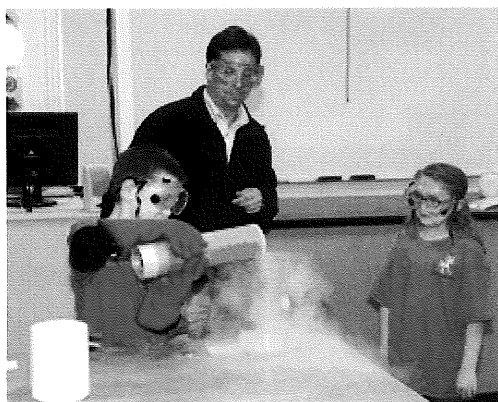
Teaching also extends beyond the classroom and into the community. One of the most enjoyable parts of my job is the interaction I have with elementary and middle school children and their parents when I visit their schools to do science shows. Public outreach activities have been a central part of my teaching career from the very beginning. From 1995 - 1999, I served as National Chemistry Week Coordinator for the Coastal Empire Section of Georgia. During these years, I organized "Chemistry Fun Days" at the local town mall, which featured numerous "hands-on" science activities for the general public. Hundreds of visitors of all ages took part in these activities each year. Over the years I have made numerous visits to elementary, middle, and high schools to talk about science and do demonstrations. Since my arrival at East Georgia College I have been very active with "Family Science Nights" sponsored by the Magnolia Midlands Georgia Youth Science and Technology Center (GYSTC) based at the college, and I have served as Tournament Director for Regional Division C Science Olympiads hosted by East Georgia College in 2008, 2009, and 2012. No matter what the ages are of the students I am seeing, I make it a point to have the students themselves involved in doing the demonstrations. There are very few things more amazing than to see the excitement of a third or fourth grader when he or she pours liquid nitrogen out of a dewar into a beaker, or shrinks a balloon, or shatters flowers immersed in the nitrogen! Hopefully, the students will keep this excitement, interest, and appreciation for science throughout their lives.

In summary, I strongly feel that an effective teacher must be willing to try new things in the classroom and be flexible in the methods that he/she uses. I have found that the abilities of the students in a particular class can vary significantly from semester to semester - requiring me to alter my teaching style on short notice if the students are not understanding the material. This is easier to do when you have a good repertoire of teaching activities to fall back on. Professional development and service activities help me acquire the teaching skills necessary to be a good educator by providing me with new ideas, new demonstrations, and new ways to explain different concepts. Teaching, professional development, and service are all linked together, and to be an effective educator, a person needs to have a good balance in all three areas. Probably the most difficult part about being a teacher is having to accept that, despite my best efforts, not all of my students will reach a complete understanding or appreciation of the material. However, by varying my methods and experimenting with new ideas, I strive to reach as many students as possible so that they leave the class with a better understanding and appreciation for science than when they arrived.

Paul Cerpovicz

Educational Service

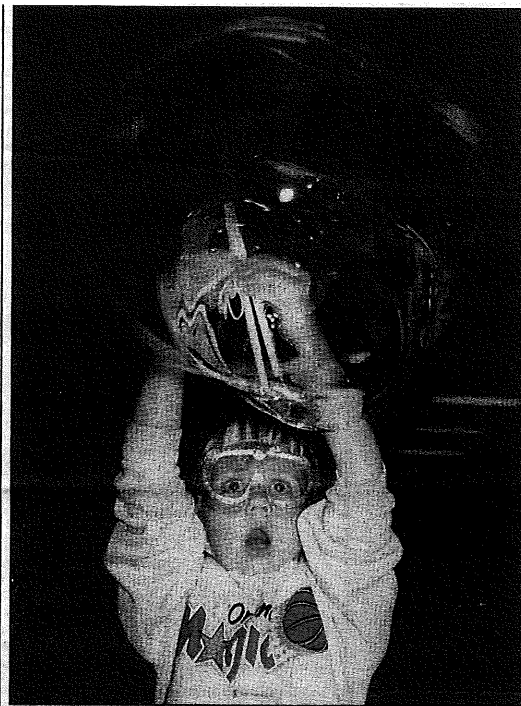
Over the years, my professional and community service has basically revolved around the promotion of chemistry and science to elementary, middle, and high school students, as well as the general public. From 1996 to 1999 I served as the National Chemistry Week Coordinator for the Coastal Empire Section of the American Chemical Society. While at Georgia Southern University, I initiated and organized annual "Chemistry Fun Days" at the mall in Statesboro, Georgia during National Chemistry Week. I also organized a chemistry show at the Glynn Place Mall in Brunswick, Georgia. These community events were designed to show people of all ages the importance of chemistry and science in everyday life and hopefully reduce some of the stigma people have when it comes to science. They also served as educational opportunities for the college students who volunteered to help put these shows on. I continued this service at East Georgia College with my participation in the Post-Secondary Readiness Enrichment Program (PREP), the K-2 Initiative, visits to local public school classrooms to do chemistry demonstrations, and my involvement with "Family Science Nights" sponsored by the Magnolia Midlands Georgia Youth Science & Technology Center. In 2008, 2009, and 2012, I served as Tournament Director for Regional Division C Science Olympiads hosted at East Georgia College. All of these events are not only very enjoyable to do, but they serve a worthwhile purpose by helping students see how important, fun, and interesting science can be.



K-2 Initiative



2012 Science Olympiad



DAVID ROGERS/The Eagle

Bubbling with anticipation

Kate Martin, age 6, creates a giant bubble after several failures. The GSU Chemistry Club put on a demonstration at the Statesboro Mall Saturday afternoon. Besides making monster bubbles, the club demonstrated the effects of liquid nitrogen on everyday objects, how to extract DNA, the properties of gases and how substances change under different conditions. The point was to prove that chemistry is not only important, but can be fun.

Chemistry Fun Day,
Statesboro, GA Mall

Teaching Methods and Assessments

My methods of teaching have varied greatly since I first began instructing students in 1995. For the most part, I mainly present material in the traditional lecture format since I am comfortable with that approach and most of my students seem to prefer it. I do mix things up quite a bit though, and have tried (and am still trying) many different methods of instruction. One thing I try to do routinely is to supplement class “lectures” with small group work and demonstrations. Over the years, I have found that students relate to and understand chemistry better if they are presented with visual classroom demonstrations during the traditional lecture session. Chemistry is a very abstract science, and many students find it difficult to conceptualize such things as atomic structure, molecular shape, chemical reactions, kinetics and chemical equilibria. Taking a few minutes of time during a lecture to visually demonstrate these concepts, seems to help students to better understand the subject matter. Classroom demonstrations also help to break up the apparent “dryness” of a traditional lecture. I find that the best demonstrations are those that are not too “flashy” and are easy for students to follow. It is always very amusing to see the faces of students as I implode a balloon, do a precipitation reaction, or show them a reaction that glows in the dark, as we discuss various chemical reactions. Comments from anonymous end-of-semester faculty evaluations indicate that most students appreciate the demonstrations:

Principles of Chemistry I:

“He used visual examples to show us what he was talking about.”

“He used experiments that showed us what was happening and they made class enjoyable.”

“I really liked the demonstrations in class because they helped me understand the material better. You could actually see what was happening.”

Principles of Chemistry II:

“Demonstrations made the principles easier to understand and the knowledge easier to retain.”

“He did experiments during class to better explain the points he was trying to make.”

In addition to “lecturing” I have experimented with guided-inquiry type instruction over the past few years. For example, over the summer break in 2009, I created videos of many of my lectures and posted them on GaView Vista for my students to access. During the fall semester, I replaced much of my traditional lecturing with guided-inquiry activities that the students worked on in small groups. Some of these activities were self-created, while others were purchased with permission to distribute to students. An example of a part of one of these activities that introduces students to the concept of the mole, a common counting unit in chemistry, is:

Information: Atomic Mass Using Atomic Mass Units (amu) and Grams (g)

One atomic mass unit (amu) is equal to 1.6611×10^{-24} grams.

Critical Thinking Questions

1. According to the periodic table, a single carbon atom has a mass of 12.011 amu. What is the mass of a single carbon atom in grams?
2. How many carbon atoms does it take to equal 12.011 grams?

3. According to the periodic table, a single phosphorus atom has a mass of 30.973 amu. What is the mass of a single phosphorus atom in grams?
4. How many phosphorus atoms does it take to equal 30.973 grams?
5. Compare your answers to questions 2 and 4.

Information: What is a Mole?

Hopefully, you found that your answers to questions 2 and 4 were about the same. Both answers should be about 6.02×10^{23} . The quantity, 6.02×10^{23} is Avogadro's constant and we call it the "mole". Just like the quantity "12" is called a "dozen", so the quantity 6.02×10^{23} is called a "mole".

By definition, a mole is the quantity of atoms necessary to equal the element's atomic mass in grams. So, according to the periodic table, one atom of sodium has an atomic mass of about 22.99 amu. If you weighed out 22.99 grams on a balance, you would have 6.02×10^{23} atoms of sodium present.

My intention was that the students would read over the textbook ahead of time, watch video clips if needed, and work on the guided-inquiry activities during class time with only limited guidance from myself. It did not quite work out as I envisioned! While a few students thought highly of this format, most students were very uncomfortable with guided-inquiry, and were "upset" that I would not just tell them what they "needed" to know. In the end, the majority of the class was disgruntled and the success rate for the class was essentially unchanged.

For the next few semesters I tried a mix of traditional lecturing, along with the guided-inquiry group activities, with, again, essentially no change in student success. In spring 2011, I tried assigning the guided-inquiry activities as "weekly homework" to be done before we covered the material in class. These were collected, graded, and returned to the students during the week we were going over the material in class. The goal was for the students to use these activities to walk themselves through the concepts beforehand so that they would get more out of the class lectures and be able to ask more meaningful questions. Student comments on surveys were mixed as usual, but tended to be favorable toward the guided-inquiry homework:

Survey Question: What did you think of the weekly homework assignments in helping you to prepare ahead of time for the class material?

"I used the homework assignments as preparation for class and for exams. I definitely believe they were beneficial!"

"Very helpful, but sometimes I think they should be done after the lecture."

"The homework challenged me and seemed confusing but it helped me understand the lecture the following week - I loved it!"

"Some were helpful but at times they did not help because I was unsure - I think for a grade it should be taught - then assigned."

Although the overall success rates for the two sections of Chemistry I for the spring 2011 semester were not improved (in part due to a large number of withdrawals), there was an 11% increase in the post-test scores at the end of the semester. Each semester I give a 15 question pre-test on the first

day of class, and a similar set of questions at the end of the semester to help assess student learning. For those students who took both the pre- and post-test, the average post-test score was 71.4% in spring 2011 (up from an average of 60% for the previous three semesters).

On this positive observation, I planned to try this format again in fall 2011. However, due to the large amount of time needed to grade the weekly assignments, and an expected increase in course load for the fall, I opted to replace the guided-inquiry activities with an on-line web learning (OWL) system that accompanies the assigned textbook. OWL consists of computer-based tutorials, animations, and homework assignments. The students need to achieve "mastery" of an assignment to receive credit, and can work on them until they do so. The activities are graded automatically and the students receive instant feedback and guidance if they are having difficulty. When anonymously surveyed, a majority of students commented that OWL kept them very busy but was overall helpful:

Survey Question: What is your opinion of the OWL Homework assignments as a learning tool in helping you to understand chemistry?

"OWL was great! You could work the problems until you understood them."

"Honestly, even though I hate the OWL homework it was very helpful."

"Yes. The OWL assignments allowed me the opportunity to practice the material from class and get extra help on things I didn't understand."

"Very time consuming, but very helpful. I love getting an immediate response."

"OWL helped me to understand many concepts that I was having trouble grasping. The tutorials helped me to understand the concept before I advanced to the homework. Overall, OWL helped me in many ways."

This time, when assessing the fall 2011 Chemistry I classes, the post-test scores were back to a typical average of 61%, but there was nearly an 8% increase in the overall success rate of the students (defined as the percentage of students initially enrolled who finished the course with a grade of C or better) - up from an average of 55.2% for the previous eight semesters to 63.4%:

Course	Semesters	Initial Enrollment	Grade (% of students)						Pre-test Avg.	Post-test Avg.	Success Rate (%)
			A	B	C	D	F	W			
Chemistry I	F07 - Sp11	270	13.0	18.1	24.1	14.1	11.9	18.9	22.9	61.6	55.2
	F11	71	14.1	23.9	25.4	14.1	15.5	7.0	24.9	61.9	63.4

The big question is, was the increase in success rate due to the introduction of OWL, or was it due to the much lower percentage of students who withdrew from the classes in the fall? Why was the withdrawal rate lower in fall 2011? Is this linked to OWL? This is the difficulty with trying to assess how a class is going. There are many variables to consider that may influence the success of a particular class from semester to semester - the biggest of which is the students themselves.

Based on the results of the past two semesters with guided-inquiry and OWL homework assignments, I will continue to refine their use as learning tools for the near future to see if they are really having a positive impact on my classes. I now have the guided-inquiry assignments posted on GaView Vista for the students to access for practice. Also, based on student comments, I

weeded out redundant questions in the OWL assignments list for spring 2012 to reduce the time students spend on OWL but still give them the benefit of the homework. The assessment of the spring 2012 classes is still pending.

Over the years, to try to get a better understanding of my classes, I have used several methods to assess how well students have grasped the concepts taught to them over the course of a semester. The assessment of students in a course can take on many forms. In all of my classes, I try to make use of both formative (non-graded) and summative (graded) assessments of student progress. Both forms of assessment have helped me to not only evaluate how well students are doing in the class, but also to catch any potential difficulties they may be having, and to adjust my teaching style accordingly in order to try to help the students to succeed.

I have used a number of formative assessment measures in each of my classes. I typically find that, after covering a particular topic and doing examples on the board, there are usually not very many questions posed by the students, and most will just nod their heads when I ask if they understood what we discussed. From experience, however, I have found that a number of students can be uncertain of the material and, for various reasons, are unwilling to voice their uncertainties to the class as a whole. To help me get an immediate feel for how well the students are really grasping the concepts, I often ask them to solve a problem themselves at their desks after I have covered the concept in class. While they are working, I walk around the room, look over their shoulders to see how they are doing, and answer any questions on a more one-on-one basis. As I do this, I get a better picture of the percentage of students who are, at that time, understanding the material. I have also found that many students are much more willing to ask me questions as I walk by. This approach gives me the opportunity to see what I may need to clarify to the entire class, or catch something that I may have forgotten to tell the class about the topic we are covering.

I have also used “one-minute” papers to get a quick assessment as to how students are preparing themselves and studying the concepts for the class. For example, an important skill in chemistry is the ability to convert between different units of measurement. After going through these in class, and emphasizing the importance of this skill to the students, I often “test” their understanding during the next week by giving them “one-minute” to answer questions such as:

Fill-in the blanks to make each of the following equalities true:

- a. _____ m = _____ μ m
- b. _____ mg = _____ g
- c. _____ lb = _____ g

To have them take this exercise seriously, I give them the opportunity to earn bonus points on their next exam for each correct answer. These assessments usually give me a good idea of which students are focused and motivated to learn the material, and which are not.

As a variation of these methods of formative assessment, in fall 2011 I began using a classroom response system (i.e. “clickers”) in my classes. I incorporated questions in my class PowerPoint slides related to the concepts that were recently discussed. The students could respond anonymously using the clickers, and I was able to instantly see how well they were understanding the material. From this, I was either able to move on with new material, or go over key points again from another angle to help clarify the concept. I personally have found the clickers to be very useful, and the majority of student responses on surveys were positive for the use of clickers as well:

Survey Question: How did you like using the Clickers in the class? Were they beneficial in helping with your understanding of the material?

"The clickers were a fun way to see the concepts at work. It also helped seeing that I was not the only one confused."

"The clickers kept me alert in class and allowed me to participate in the lectures."

"They gave a clear understanding to the professor if we understood the material, but did not benefit me as a student."

"When we used the clickers it helped me to gauge where my weaknesses in comprehending questions were. They are very beneficial to helping me understand the material."

As another means of assessment, I try to correlate the laboratory assignments in each of my science classes to the lecture material being covered at the time. For example, after covering stoichiometry in class, we will have a lab activity on the same concept. As the students are completing the lab, I am able to get a feeling for how well the students can apply the concepts we covered in the previous class lectures. During lab, I circulate around the room to see how the students are doing, give comments about their technique, and answer any questions they may have. If I notice that students are having a great deal of difficulty with the concepts during lab, I can revisit the topic during the next class lecture.

While formative assessments can be very useful for helping an instructor guide a class, it is also important to give graded, summative evaluations to measure student progress. To this end, I evaluate the students in each of my classes in a number of ways. For each of my classes, I typically give four "hourly" exams throughout a semester, and occasionally quizzes. All of my science classes have laboratory activities which are collected and graded. Part of their laboratory grade includes pre-laboratory assignments which are given to them on-line through GaView Vista. In the past, students in my *Principles of Chemistry II* classes have completed written reports for specific labs, or written career statements, and in *Organic Chemistry* students keep formal laboratory notebooks. For all of my classes, students are expected to take part in three separate, week-long on-line discussions given through Vista. The students read posted articles about an area of science that is currently "in the news", and exchange their opinions and comments about the articles with each other over the course of the week. These are fairly informal assignments, and are graded primarily on participation.

As another means of summative evaluation, and to get a feel for how much of the subject material the students have really learned over the course of a semester, I began a process of giving my students a pre-test at the beginning of the semester that is similar to the test they will have during the final exam week. As an incentive for students to try their very best on the pre-test, I count 10% of whatever grade they make on the pre-test as bonus points on their final exam grades.

Over the years, I have gone back and forth as to how much homework I require students to do. As mentioned earlier, in spring 2011, I began assigning graded, guided-inquiry based homework assignments that the students completed before we covered the material in class. While some students were resistant about doing assignments ahead of the class lectures, many commented that they were beneficial. In fall 2011, I changed the homework to the OWL system that accompanied our textbook. I have been fairly pleased with OWL as a learning tool, and the majority of my students have commented highly of it as well. Because of this, I am now using OWL for all of my major courses - *Chemistry I*, *Chemistry II*, *Organic I* and *Organic II*, and am considering for the Biochemistry courses I am currently developing

for our B.S. in Biology program. As with anything though, students will only get out of an activity what they put into it. Many students are naturally motivated and will do well under any circumstances. Other students will struggle and be unsuccessful no matter what an instructor tries to do. Sometimes the students that an instructor has the most influence over are those "borderline" students who need to be tipped over to the side of success.

To help focus our efforts to assess students and improve class success, the East Georgia State College faculty now develop assessment reports for our classes each semester. As an example, a portion of a Course Level Assessment Report for Chemistry I from spring 2011 is given below:

Semester Course Level Assessment Report - Spring 2011

Course Number and Title: CHEM 1211: Principles of Chemistry I

Check General Education Student Learning Outcome number assessed:

Check	No.	Student Learning Outcome
X	2	Students will <u>demonstrate the ability to</u> (a) gather, (b) analyze, and ©) evaluate information to make effective decisions.
X	3	Students will <u>demonstrate the ability to solve problems</u> (a) algebraically, (b) numerically, and ©) graphically <u>at the level necessary to succeed in higher education.</u>
X	4	Students will <u>demonstrate effective use of the scientific method.</u>

Course Objectives:

- 1) To increase student performance on the pre- and post-test results for the relevant SLOs associated with this course.
- 2) To increase the overall student success rate in the course.
- 3) To increase the students' understanding of the concept of stoichiometry.

Assessment Methods:

- 1) Weekly, guided-inquiry homework activities will be given on material that will be covered and discussed during the upcoming week of class. The goal is that these assignments will help students become more actively involved in their learning, as well as give students a better understanding of the material before they get to class.
- 2) To address the observation from Fall 2010 that poor attendance resulted in a much lower success rate for CHEM 1211, a much more stringent attendance policy was adopted for the Spring 2011 semester in all classes. Attendance is now factored in as part of the overall class average. Students arriving to class on time will sign an "attendance log book" as they enter the classroom. Students arriving to class late, will sign a "late attendance log book". Students with valid, excused absences will not be penalized for missing a class.

Goal: Better attendance will lead to a higher overall success rate for the class.

- 3) To help students gain some insight into what to expect for a typical exam, I posted practice exams on the Vista site this semester. Hopefully, as was suggested, students will study before attempting

these practice exams, and then “honestly” complete them to see how well they understand the material.

Goal: Having a better idea of what to expect on an exam will make students more comfortable and help with their preparation for and success on the exams and lead to an overall increase in the student success rate.

4) It has been observed that many students have difficulty with the concept of stoichiometry. To help address this, I wrote a lab activity dealing with stoichiometry and added it to the 2011 lab schedule.

Benchmarks:

- 1) A score of 70% on the post-test questions linked to the relevant SLO.
 - 2) An overall success rate of 65% for the course.
 - 3) An indication of an increase in the students’ understanding of stoichiometry based on a pre- and post-test question related to this concept.
-

In summary, my teaching and assessment methods are constantly evolving. I have found that students can vary greatly from semester to semester, and oftentimes two sections of a given class can be very different within the same semester. Teaching or assesment methods that worked well one semester, may not seem to work as well during another semester - many times for no apparent reason. While there is always a strong desire to increase the success of a class, instructors must be very careful not to lower the standards for a class in order to increase “success rates” - either deliberately or inadvertantly. All that an instructor can really do is to be flexible, try a variety of teaching methods and constantly assess how each class is going from moment to moment to try to make the class as successful as possible.

Sincerely,

Paul Cerpovicz