

The Magazine for ACS Student Members
September/October 2010

in Chemistry



Graduate School: Navigating the Challenges



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Chemical Demonstrations — Why Do Them?, p. 5

Successfully Navigating the Ups and Downs of Graduate School, p. 9

How to Be an Effective Teaching Assistant, p. 12



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c o n t e n t s

EDITORIAL

Find Your Own Path

By Peter K. Dorhout

2

ASK ACS

By Robin Lindsey

2

ACS STUDENT CHAPTER SPOTLIGHT

Compiled by Audley S.V. Burke

3

CHAPTERS

Doing More with Chem Demos, Part I

By Brittlund DeKorver

5

FEATURES

Navigating the Ups and Downs of Graduate School

By Burt Hollandsworth

9

The Teaching Assistant's Guide to Success

By Amy M. Hamlin

12

Mastering Graduate School Acrobatics

By Allison Proffitt

14

Voices of Experience

Compiled by the Office of Graduate Education

18

CAREERS

Are People Hearing What You're Saying?

By Lisa B. Marshall

20

ACS RESOURCES

Informing and Preparing Young Chemists

By Joe Z. Sostaric and Corrie Kuniyoshi

22

MEETINGS

Meeting and Learning by the Bay

By Angie Amick

24

Call for Papers: 241st ACS National Meeting in Anaheim, CA

26



LINDA WANG/CSN



MIKE GIESLSKI

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COURTESY OF WILKES UNIVERSITY

Find Your Own Path

BY PETER K. DORHOUT



DEBBIE SHEAFER

You may be reading this edition of *inChemistry* because you've already decided to pursue an advanced degree in chemistry. Or, if you are like me when I was an undergraduate, you may be unsure what you want to be, whether you should go to grad school, and what to expect if you do so. In either case, you'll find many resources in the following pages and on the ACS website that can help you.

My parents were teachers, and I was sure that being a teacher was not in the realm of possibilities for me at the time. I also knew that you needed to grow horns and a tail before becoming a university vice president or graduate dean (mine are coming in nicely, thank you).


I had done undergraduate research in a number of research groups, trying different flavors of inorganic chemistry, and hadn't decided what I wanted to do for a career. I tried a co-op internship before I eventually decided to go to graduate school. Along the path to earning my Ph.D., I still had no specific goals, but I did end up on an interesting academic trail and earned a graduate degree that opened doors for me.

Clearly, I'm not the "Uncle Sam" recruiting poster for graduate school (even though that's really my day job). My point is that there are many ways to get to a place where you might decide that a graduate degree in chemistry is right for you. To quote Dr. Seuss: "You have brains in your head. You have feet in your shoes. You can steer yourself any direction you choose."

To decide on your own direction, there are many questions to ask yourself, and two of the most important are: "What are my career goals?" and "What kind of graduate degree will I need?"

To find the answers, you should build and then utilize your own network of trusted colleagues — all of whom see you differently than you see yourself. In my own experience, having good faculty mentors and advisors, close friends, and an understanding spouse were each critical in my development.

Along your professional path, seek out the resources and signposts that ACS provides for you. Peruse the *ACS Directory of Graduate Research*, get involved in your student chapter or local section, connect with peers and potential employers at regional and national meetings, and get engaged with your division or committees, such as the Younger Chemists Committee. Find all the resources you need at the Graduate Student web-page (www.acs.org/grad) of the ACS under the Education tab.

Best of luck to you on your own path. 

PETER K. DORHOUT is Vice Provost for Graduate Affairs at Colorado State University, is Chair of the ACS Graduate Education Advisory Board, and also represents District V on the ACS Board of Directors.

BY ROBIN LINDSEY

Do you have questions relating to ACS student chapters or other programs at ACS? If so, ask Robin at undergrad@acs.org!

Q How can we start or reactivate an ACS student chapter on our campus?

A Once you identify a faculty member to serve as your chapter faculty advisor, complete an Application for an ACS Student Chapter Charter and compose a set of proposed bylaws for the chapter. The application and a sample set of bylaws are available at www.acs.org/undergrad. When your application is approved, ACS will grant your school a charter and send it to your faculty advisor or the chair of the nearest ACS local section, who will present the charter to your new ACS student chapter!

To reactivate a student chapter, complete the Chapter Reactivation Application at www.acs.org/undergrad. Once your reactivation application is approved, you will receive a letter confirming your status as an active student chapter.

Q How can our chemistry club qualify to be an active ACS student chapter?

A Each student chapter must have at least six paid ACS student members on its roster to be recognized as an active ACS chapter. To maintain active status, ACS student chapters must complete chapter reports at least once every three years. Many chapters opt to submit reports more frequently to be considered for Outstanding, Commendable, or Honorable Mention awards or Certificates of Achievement.


Q What is the deadline for submitting a chapter report?

A Chapter reports for the 2009-2010 academic year were due on May 26, 2010. However, if your chapter missed the deadline and wants to maintain its active status, you can still submit the chapter report online at www.acs.org/undergrad.

Q We submitted a chapter report by May 26, 2010. When do we find out if we won an award?

A The review process begins in June, and final decisions are made in July. Reviewers' comments are compiled in August. A message with feedback on the report and the award level will be sent to each faculty advisor in September, and a formal letter to the department chair will follow. This information will also be published in the November/December 2010 issue of *inChemistry* magazine and in *C&EN*.

Q How can I get a link to my chapter added to the "Find a Chapter" webpage?

A Please send an e-mail to undergrad@acs.org and include the name of your institution and the complete URL for your chapter's webpage. Please allow two weeks for the updated information to appear on the page. 



ROBIN LINDSEY is Lead Program Associate in the ACS Undergraduate Programs Office.

Share what's going on in your chapter! If your chapter would like to be featured in the ACS Student Chapter Spotlight, please contact Audley Burke at 800-227-5558, ext. 4565, or a_burke@acs.org.

COMPILED BY AUDLEY S.V. BURKE

Central Michigan University Mt. Pleasant, MI

Chapter president: Ashley Morgan
Number of chapter members: 30
Number of ACS student members: 16
Institution environment/ composition: Large, public, suburban, 4-year institution

Q What methods do you use to retain members from year to year?

A Students come to meetings and events when there are exciting announcements and food. We involve general members at each meeting and really value every suggestion and idea shared. If our executive board members are excited about our events and have positive attitudes at our meetings, other members will likely become just as excited and involved.

Q In what ways does your chapter give back to the community?

A We really enjoy participating in outreach programs, and we also work at campus events, including Camp Quality, a program for children with cancer and their families. The chapter collaborates with our ACS local section to run Camp Chemistry, an event for Michigan Girl Scout members. We have also recycled printer cartridges and batteries and participated in the on-campus Relay for Life event.

Q How did you celebrate National Chemistry Week and/or Chemists Celebrate Earth Day?

A Our chapter plans events for each day, including making and selling liquid nitrogen ice cream and french fries. We operate a fryer fueled by biodiesel and advertise the event using a biodiesel poster,

displayed at the event. This year, members also collaborated with our ACS local section and did plant/seed-related activities and demonstrations. We gave lectures about plants and green chemistry to middle school students.

Q What was your most popular social event?

A This past year, our most popular social was our ice skating social.



We went to our local ice arena and simply participated in Open Skate. Many members came to the event and brought friends with them. It was a new social event this year, so we think a lot of people were really excited about it.

Q Do you collaborate on activities with other clubs on campus?

A We collaborate with the American Indian Science and Engineering Society (AISES). Chapter members have performed demonstrations at the local tribal college and have held fund-raisers together.

Q What activities have you done to promote green chemistry?

A Our chapter has participated in events, including seminars and forums to promote green chemistry and the Earth Day activities discussed above. This has allowed us to meet with scientists to discuss how our chapter can practice green methods and promote green chemistry.

become a long-term commitment that I would thoroughly enjoy!

Q What challenges have you faced in your position?

A The biggest challenges always seem to arise when some of the most active members graduate; the students are only here for a short time (which to them may seem like an eternity). We are constantly training new leaders, and change is never easy. As an advisor, I help in the transition process as best I can, which sometimes can be challenging.

Q What advice can you offer those new to the advisor position?

A Network with other faculty advisors. Veteran faculty advisors have overcome many of the challenges that exist and have learned how to successfully help their students. They also may be able to help new advisors with ideas for National Chemistry Week, Earth Day, outreach and networking opportunities, and so on. The faculty advisors whom I know are truly some of the most amazing people around and are extremely helpful — all you have to do is ask.

CMU
CENTRAL MICHIGAN
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Faculty advisor:

Sharyl Majorski, 8 years

Q Why/how did you become a faculty advisor?

A When the role became vacant, I volunteered for a year. It seemed like a fun way to know my students. Little did I know it would

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University of Puerto Rico, Rico, Mayagüez

Mayagüez, PR

Chapter president: Jorge A. Benejam

Number of chapter members: 89

Number of ACS student members: 87

Institution environment/

composition: Large, public, urban, 4-year institution

chemistry competition (titration contest, for example), and a national celebration, in which all P.R. chapters participate in presenting chemical demonstrations for the general public at an event in San Juan.

Q With which local ACS student chapters have you collaborated?

student chapter members to our different activities.

Faculty advisor:

Sara Delgado, 7 years

Q Why/how did you become a faculty advisor?

A I have a good rapport with students and love working with them. I had coordinated outreach activities with my general chemistry students and invited the ACS student chapter to the activities as well. Eventually the chemistry department director assigned me as faculty advisor.

Q What challenges have you faced in your position?

A One of the challenges has been to maintain a balance among the activities that the chapter can be involved with. Our chemistry department has about 50 faculty members, and we are invited to participate actively in every congress, conference, and activities major and minor. On the other

hand, most of our students are top students who must study hard and balance the two aspects of their student life. I tried to choose among activities to set priorities and filter some of them. The second challenge is to resolve personal grievances and misunderstandings among students with different personalities.

Q What has been the most rewarding aspect of your service as a faculty advisor?

A I have seen the students mature and transform as leaders.

Q What advice can you offer those new to the advisor position?

A Maintain an open-office-door policy and facilitate communication. The students come from different backgrounds, and some may need to be taught how to write checks, draft letters correctly, and follow policies of the university/chemistry department regarding fund-raising events, parties, and so on. **ic**



COURTESY OF UNIVERSITY OF PUERTO RICO, MAYAGÜEZ

Q How do you ensure a smooth officer transition from year to year?

A We hold elections during April or May. The elected officers meet with current officers to prepare for the next year's activities and change banking account signatures.

Q How do you celebrate National Chemistry Week?

A We hold four main events during the week. We initiate new members at a formal dinner with an invited speaker. There's also a Chemistry Department Open House – where high school students visit our research labs, participate in chemical demonstrations, and attend an orientation lecture. We have Crazy Chemist Day, which features a decorated safety coat fashion show and



A Basically we have collaborated with all of the eight ACS student chapters on the island. We participate and help each other in activities such as the Earth Day celebration, scientific meetings, chapter initiations, chemistry competitions,

and other get-togethers. We have always tried to collaborate with and help other ACS student chapters.

Q What is the most effective communication tool that your chapter uses to promote chapter activities?

A Our most effective method of communication, without doubt, is the chapter's page on Facebook. Members are always checking to see if any new activities, sales, conferences, or news have been posted. We also use our page to inform and invite other, non-ACS

ATTENTION CHAPTER OFFICERS

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L IQUID NITROGEN EXPLOSIONS, flaming pumpkins, exploding eggs and pickles, and thermite reactions delight and entertain our audiences when we perform chemical demonstrations. These demos are fun, easy to do, and dramatic. But please, before you blow up another pickle, stop and think about what you're trying to accomplish, and why.

If you're like many students I talk to, you will probably tell me something about having a mission to increase the public's interest in or knowledge of science. But do you really appreciate why this is so critically important?

For me, there are two outcomes that I seek when performing chemical demonstrations. First, I hope to nurture an interest in science among young students, so that they might someday pursue an



LINDA WANG/CC-BY

Doing More with CHEM DEMOS

BY BRITTLAND DEKORVER

PART 1

education in a science field and become a scientist. In doing so, I'm trying to add to the "pipeline" of scientists.

Of course, not every student wants to have a career as a scientist, which is why I have a second goal: to increase science literacy among the masses in our society. Science literacy is important to our society because as new scientific advances are made, we as a people must deal with the legal and ethical implications that often come with these advances. To do this, we must be capable of making informed decisions built upon basic knowledge of scientific facts and the nature of science. Unfortunately, some students (and adults) are science-phobic and believe that they can't do science or that science doesn't affect them.

That's why it's vital that scientific **learning** occurs during outreach events. Learning is sometimes treated as an afterthought in science outreach. Too often, the primary objective is to entertain; if learning also occurs, it is seen as an addi-

Why Science Learning Is Critically Important to Our Future

tional benefit. Why do we, as informal science educators, tend to highlight the dramatic more than the educational? Because making chemistry flashy and exciting is easy: color changes, fog, glow-in-the-dark substances, and — the crowd favorite — explosions. Creating a learning experience, however, is more challenging. You've studied for years to obtain your chemistry knowledge. How do you convey it to an audience in just a few minutes' time?

Help the audience relate

Find a relatable context for the demonstration or activity. Show the audience how the knowledge can be applied in their everyday experiences. Food, alternative or renewable energy, electronics, and clothing are just a few examples of areas where you can find some relevant or timely topics to incorporate into your outreach.

Design a multisensory experience

Many times, we orally explain a particular demonstration in a few sentences after it's over. Generally, we use what we think are basic terms — but often, even these terms are new or unfamiliar to our audience. Consequently, our well-thought-out explanation will have little or no lasting impact on the audience.

Instead, consider using signs or posters to display key words so that the audience can read them. Use models for a particular reaction or process so that the audi-

ence can gain detailed knowledge. You can purchase the models from an educational supplier, or find images or video clips, or design and make something yourself. You may want to experiment with incorporating movement into your show by having the audience participate via gestures, clapping, standing, or sitting. For example, you can assign a meaning to a movement and have the audience repeat the movement at appropriate times throughout the show, or you can ask audience members to come up on stage and act out the functions of molecules you are describing.



LINDA WANG/C&EN

Strive to create demos that entertain AND increase science literacy.

FUSION SCIENCE THEATER

Science learning can be fun, but creating that educational experience is far from easy! Fusion Science Theater (FST) is one approach to creating science demo shows that entertain and teach. FST is a nonprofit group of science educators, outreach professionals, and others collaborating to make science more engaging, educational, and inspiring. FST shows are designed to teach one central concept using the natural "story arc" of theater to model scientific investigation.

The show begins with a question, followed by observations, experiments (the demos), and data to provide the story development, and in the show's climax, the question is answered. A genre and characters, such as a game show or three-ring circus, provide a familiar framework and humor to draw in the audience. Audience members take part in the show through call-and-response, answering questions, sing-a-longs, act-it-outs, and other activities in order to provide a life-size kinesthetic and visual model.

Another unconventional technique that FST uses is embedded assessment, in which performers give out ballots for audience members to vote on which hypothesis they believe is correct. It has been demonstrated that when this approach is used, the audience gains significantly greater understanding of the topic. Surveys have also shown that audiences find such shows exciting and enjoyable.

FST shows have been developed on a variety of topics, from electricity to phase changes to combustion. As scripts continue to be developed, FST is looking for student groups who want to perform FST shows. FST will provide the training, scripts, and other support. Interested groups can find more information at www.fusionsciencetheater.org or by checking out the FST Facebook page.



Get the audience involved

Using movement is one way to get the audience involved in your demonstration. Another is to ask questions that provoke the audience and spark debate. "What do you think will happen if I (or you) do this?" is a good one. If you have a small group (less than 30), you may want to provide your audience members with name tags so that you can call on specific people by name for answers. Keep in mind, however, that soliciting predictions for the results of an experiment won't work if you tell them what will happen beforehand!

Experiment with formalizing the investigative process by teaching one central concept with a series of related demonstrations.



Use the element of surprise

Surprising your audience will capture their attention. I have seen many demonstrations where the presenter says something akin to, "When the base is added to the indicator, it will turn pink!" That may be true, but by simply rephrasing the statement as, "Watch what will happen when I add this base!," you will engender more interest in the audience. If you are worried that the audience might miss subtle or fleeting effects, repeat the demonstration a second or third time.



COURTESY OF SOUTHERN ILLINOIS UNIVERSITY



COURTESY OF AUSTIN PEAY STATE UNIVERSITY

Safety first! Kids and ACS student chapter members from Austin Peay State University (above) and Southern Illinois University (left) model appropriate eye-wear while performing chemical demonstrations.

Model scientific investigation

Simply telling the audience what to expect is not how to model scientific investigation. The presenter and presentation should teach the *nature* of science, as well as scientific knowledge. Many of the recommendations above reinforce this goal. Allowing the audience to make observations rather than confirming what you describe will emphasize the importance of gathering data. In your model or explanation, you should use the evidence and refer back to the demonstrations. Allowing the audience to be surprised at a result or asking them to make predictions using prior knowledge also gives them insight into the practices of scientists.

Aim to teach one central concept

You might also try to formalize the investigation process by **teaching one central concept** with a series of related demonstrations. At the beginning of the show, you could ask the audience to observe a phenomenon and form a question. Each subsequent demonstration or model might give an essential piece of information that can be put together to arrive at a conclusion.

Always remember, safety first!

Finally, the most important concept, and one that you must always demonstrate, is safety. Don't hesitate to draw attention to the safety precautions you take, from wearing gloves and goggles to having a fire extinguisher handy. Make sure that you are taking all appropriate precautions in preparation, presentation, and cleanup. In addition to consulting

the original source of your demonstration for safety information, look for additional concerns or tips to make a demo safer by reading the work of other demonstrators. The online database of the *Journal of Chemical Education* (find it at <http://pubs.acs.org/loi/jceda8>) is a great place to begin your search. All presenters of your demonstrations should be familiar with the hazards and should know an explicit course of action to follow in the case of any mishaps for each demonstration they perform.

Of all my recommendations for engaging and educational shows, the only ones that are absolutely required are those involving the safety of the audience and presenters. However, including even one or two of the other minor changes could dramatically improve the quality of the learning experience for your audience. You may recognize that you already do incorporate some of these elements in your shows. If so, bravo! But even great shows can be improved by spending time to reflect on your outreach program, its goals, the content provided, and the needs of your audience. **ic**



LINDA WANG/CREV

While performing a chemical demonstration, try to ask questions to provoke your audience to think and to spark debate.



BRITTLUND DEKORVER works for the Institute for Chemical Education at the University of Wisconsin-Madison as an outreach specialist, coordinating after-school science clubs and advising Students Participating in Chemical Education (SPICE), a student organization on campus.



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Navigating the Ups and Downs of Graduate School

Eight Common Pitfalls... and How to Avoid Them

BY BURT HOLLANDSWORTH

THERE IT IS. IT'S SITTING IN YOUR MAILBOX. You glance and see that it's a thick envelope from the well-respected, top-notch chemistry graduate school that just happens to be your first choice.

Your friends make you open it, and after a suspenseful moment you exclaim, "I'm in!"

You've just experienced your first graduate school high. Of course, there could just as easily be a letter that politely thanks you for your application, mentions that it was an especially talented class of undergraduates that applied this year, and wishes you the best with your other applications. Unfortunately, this is the start of the "ups and downs" of graduate school.

Even the best students will experience high and low points in their graduate careers. Here are some of the major pitfalls that you might encounter, and how to avoid them in most cases.



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9

Choosing the wrong advisor

Four or five years of working for the wrong person will wreak havoc on your mental condition. Advisors come with all sorts of managerial styles, most of them learned from their own Ph.D. and postdoctoral advisors. Try not to pick a Ph.D. advisor solely on reputation, number of publications, group size, or by the advisor's research description in a catalog. Soon after arriving on campus, interview the advisors and get a feel for their personalities.

Narrow your focus to two or three potential candidates, and then spend a considerable amount of time talking to their graduate students and postdocs.

Get a feel for their managerial style by asking questions like, "How often is this person in the lab?," "How often are group meetings?," and "How much of the day-to-day tasks and training are handled by the postdocs and senior members of the group?" If you are the type of person who needs creative space, don't join the group of a micromanager or an advisor who sets strict work hours. Conversely, if you feel like you need guidance and direction and will need an advisor who is continually challenging you with new ideas and checking up on you throughout the week, then go with someone who will keep you focused. Picking a not-yet-tenured faculty member is one way to ensure that you will get plenty of personal attention and will be challenged to produce results quickly and often. A personality mismatch with your advisor is a pitfall to avoid from the start.



learn new lab skills and enjoy the thrills of frontline research. However, even though you may be tempted, don't spend every waking hour in the lab, especially if you are in a more competitive research group. Working too hard will cause a quick burn-out, especially if your research is not producing results commensurate with your effort. It is not a pretty sight when graduate students burn out. They become irritable when small things go wrong or when they perceive that other group members are not working as hard. They sometimes become discouraged and start to work strange hours to avoid other people. Schedule some leisure time in your day that will get your mind off of chemistry. Join some friends for a regular walk or workout and encourage each other. It's a great idea to take at least one of the days of the weekend off to recharge your energy level.



Having too many advisors

Another situation to avoid is having too many advisors. It's not uncommon to work for two research groups at the same time on a collaborative project. These collaborations expose students to different types of experiments, give increased access to instrumentation and other equipment and personnel, and also give students two potentially strong recommendation letters instead of one. However, in some cases, neither advisor keeps track of "shared" students, and over time the students might fall off the map. If you choose to work with two Ph.D. advisors, be intentional about maintaining a strong relationship with both of them.

Spending too much time in the lab

Graduate school will be the best time of your life to focus solely on chemical research. Take advantage of the time that you have to



Spending too little time in the lab

Avoid being the group workaholic, but also avoid being the slacker who spends the least amount of time in the lab. Put yourself on a schedule, even if you are producing steady results. One unfortunate aspect of working for busy advisors is that they don't spend much time in the lab. If you are never there when they happen to be walking through the lab, then it is easy to fall through the cracks and out of favor with your advisor.

Letting results dictate your outlook

Every graduate student goes through both productive and slow times in the lab. The nature of chemical research

dictates that there will be reactions that do not work, computations that need to be redone, and instruments that need to be fixed. Most graduate students will tell you that interesting results typically come in small bursts when several components of the research come together all at once. It's important to maintain some emotional distance from the process. Celebrate when things go well, but don't let your research success be the only source of joy in your life. When the results are lagging, keep in mind that a temporary stall in one area of research might yield unexpected results in the future. Think of every unexpected side product or instrumental glitch as another paragraph in your thesis.

Painting yourself into a corner

Consider adopting the strategy of working on two separate lines of research at the same time. For instance, if your main research problem is the synthesis of a protein inhibitor, do some



Most graduate students will tell you that interesting results typically come in small bursts when several components of the research come together all at once.

computational work on the side modeling the active site-inhibitor complex. If your synthetic work hits a snag, at least you will have some computational results to fall back on. If your computations become frustrating, then maybe you can make a breakthrough with an interesting synthetic intermediate. In this way, you can avoid putting all of your research "eggs in one basket."

Living an unhealthy lifestyle

Hopefully, you will look back on graduate school as the most productive time of your life. For some chemists, graduate school was also the time when they picked up some of their worst habits. Binge drinking or drug use is not a good response to failed research efforts. Drinking may help you forget your research troubles for a night, but they will still be there the next day. Stimulants may help you work all day and night on Monday but will cause you to crash on Tuesday. Keep a healthy and responsible attitude toward stress relief, and surround yourself with friends who do the same. Take time to exercise and to otherwise take care of yourself.



Being afraid to say "no"

One of the hardest lessons to be learned is how to say, "No." There is nothing wrong with politely declining to be a graduate student council representative, teaching a course as an adjunct, reorganizing your group's chemical inventory, redesigning the group webpage, or running the summer softball league if you need to focus on your lab work. None of these activities is inherently bad, but they will all detract from your primary mission in graduate school, which is to contribute a body of original scientific work to the field of chemistry. You may be tempted to pad your résumé with all sorts of extracurricular activities, but remember that no item will carry more weight than a strong recommendation from your Ph.D. advisor.

Remember, too, that you are not alone — so do not isolate yourself. Build a network. Great places to start are joining the ACS Graduate Students Facebook group or a LinkedIn group.

As you progress through graduate school, keep an open mind. Don't become too discouraged when the going gets tough, and keep yourself open to suggestions on better ways to carry out your research. Try not to get too high or too low when the results roll in or dry up. Avoid the common pitfalls... and your graduate school experience will be as enjoyable as it is productive. **IC**



BURT HOLLANDSWORTH graduated from The Ohio State University in 2004 with a Ph.D. in inorganic chemistry. He is on the faculty of Harding University in Searcy, AR, and is a member of the ACS Younger Chemists Committee.



The Teaching Assistant's Guide to Success

BY AMY M. HAMLIN

THE FIRST FEW WEEKS OF GRADUATE SCHOOL CAN OFTEN BE OVER-whelming; between adjusting to living in a new area, taking several graduate courses, and researching possible Ph.D. advisors, you will probably feel like you are being pulled in too many directions at once. Along with these responsibilities, many first-year graduate students are expected to serve as teaching assistants (TAs) for a laboratory course or discussion section. This responsibility is often one of the top worries for an incoming graduate student. But even though teaching can be stressful, it can also be one of the most rewarding experiences of your first year.

Surviving the first day

You may feel nervous about your first day of teaching. With intimidating eyes staring back at you and students expecting you to share your knowledge with them, you may be asking yourself such questions as, "Am I qualified to teach other students?," "Will the students take me seriously and listen to what I say?," "Will I be able to answer the students' questions sufficiently?," or "Can I take command of a classroom or laboratory when needed?"

Yes, it may feel strange to be the one standing in front of the room teaching a course that you took only a year or two ago. But remember, you are teaching a subject that you love and excelled at as an undergraduate. Share some of that enthusiasm with your students! If you take your teaching responsibility seriously, your students will take you seriously. Having a sense of responsibility and being prepared for each class will help you to gain your students' trust and respect and will give you authority in the classroom.

The students have confidence that you know what you are teaching, so have confidence in yourself. You do not have to know everything. If you do not know the answer to a question, be honest with the students and admit that you do not know. Have the students help you as you work through the problem, or look up the answer after class and return to the question at the beginning of the next class. The students will probably learn more this way than if you just immediately spit out the answer to them.

Learn your students' names; it will help you to gain their respect and also help you feel more comfortable in front of them. Be sure to prepare the material for each class beforehand; the more prepared you are, the more comfortable you will feel in the classroom. Brainstorm possible sticking points in your presentation or techniques that students might find difficult during experiments, and be prepared to respond to these situations.



COURTESY OF NEWBERRY COLLEGE

Seek help

Remember that you are not alone as you embark on your first semester of teaching as a graduate student. There are many resources available to you as a new TA, including on-campus teaching resource centers and professors or instructors in the department — but one of your greatest resources will be your peers.

Older graduate students were once in your shoes, teaching the same course as you. They can be full of useful advice about how to handle situations you may encounter, such as a rowdy classroom or a cheating student. They can also help you figure out how to balance your time among your many responsibilities. You might even be able to get an embarrassing teaching story or two out of them.

Your first-year classmates can also be a great resource to turn to as you develop your teaching skills. Just as you studied in groups to understand the material you learned in undergraduate courses, you can team up with your graduate school classmates as you learn how to teach. Find the other graduate students teaching the same course as you. Discuss with them that week's material and how best to present it to the students. After each week, sit down together and discuss what went well and what you could do to improve. If your section meets later in the day or week, it is also very helpful to ask someone who has just taught the class about what problems (if any) they encountered.

Solicit feedback

Consider sitting in on other TAs' sections to observe their teaching styles. Everyone explains concepts in a slightly different way, and by observing different ways of presenting the same material you will be able to improve your own skills. They might even have a trick or two that you can use to help your class run more smoothly. It may also prove helpful to ask one or two of your fellow TAs to sit in on your class while you are teaching and have them suggest improvements that you could make.

Your students can also be a great resource. After a few classes, survey your students to ask them what they like and what topics they are still confused about. The students are there to learn, so they will be honest with you about what worked for them and what did not. Each group of students is unique, so it is important to adapt your teaching style to what best fits your students. Be sure to use a variety of teaching styles so as not to favor one type of student.

Begin preparing now

There are also several things you can do as an undergraduate to prepare to teach. The first is to pay attention to the teaching style of your professors during your courses. Notice how they



Your first-year classmates can also be a great resource to turn to as you develop your teaching skills.

keep the students' attention and how they respond to questions. You can also gain some teaching experience by working as a tutor for other undergraduates. Some colleges will even let undergraduates be TAs alongside a graduate student or professor.

Strive to be your best

No one is a perfect teacher the first time they step up to the board. It is a skill that is continuously developed over years and years of practice. To be a great teacher, you must be able to evaluate yourself and adapt to what works for your group of students.

One technique that really helped me was to keep a teaching journal. At the end of every class, I wrote down what went well and what I could improve upon. This helped me to evaluate what techniques worked for me and what areas of teaching I needed to work on. I would use my notes as I prepared for the next class to improve upon the weaker points. Throughout the semester, I was writing down more and more things that went well and less about what I needed to fix for my next class. Using this technique, I saw a great improvement in my confidence as the semester progressed.

After the first few classes, you will feel more comfortable in front of your students and you will start to realize how rewarding teaching can be. It is very encouraging to help students understand concepts they previously struggled with and to watch students gain an interest and appreciation for the subject that you love. You will also gain confidence in your ability to share your knowledge with others — a quality that will help you greatly throughout your graduate school career. Remember to enjoy teaching: it is a great learning experience, and it can also be a lot of fun. **IC**



AMY M. HAMLIN is a first-year graduate student at the University of California, Berkeley, studying synthetic organic chemistry. She received her B.S. from the University of Detroit Mercy, where she was involved with the ACS student chapter.

Balancing Research and Coursework with Relationships, Hobbies, and Other Interests

Mastering Graduate School Acrobatics

BY ALLISON PROFFITT

WHILE IN CHINA recently, I saw the Shanghai Acrobatics Troupe perform. One of the acts was a group of women spinning plates. It was surprisingly beautiful. They held up to eight long, thin poles — four in each hand — each topped with a whirling plate. With the tiniest flicks of the wrist, they kept all eight discs spinning, all eight poles gracefully splayed, dancing all the while. At the end, lest you thought it was all a trick, they dropped the plates, then the poles, and everything came crashing to the ground.

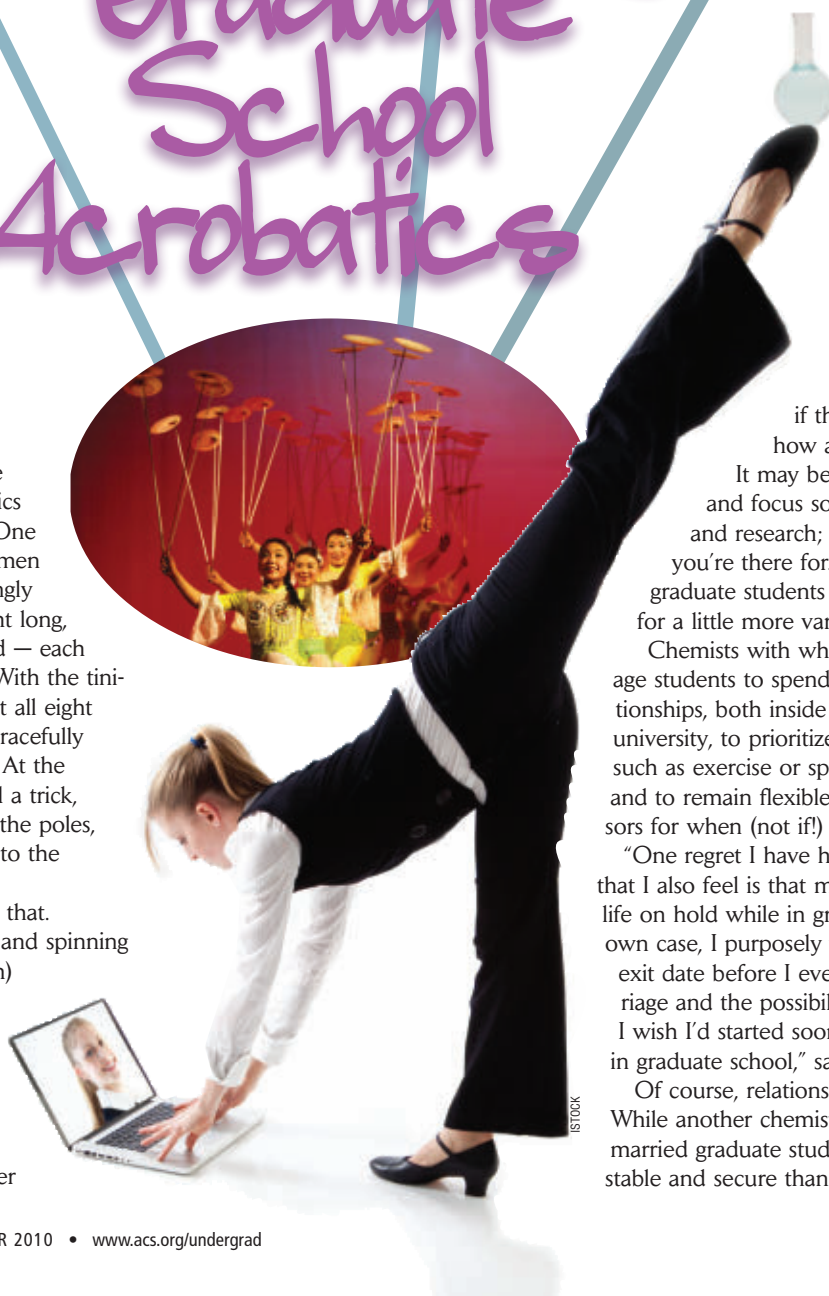
Graduate school can be like that. Keeping even two plates aloft and spinning (your coursework and research) is hard enough! Anything else — including relationships, hobbies, and other interests — seems like an impossibility. If you catch a glimpse of someone doing it well, you can't help but wonder

if their plates are somehow attached to the poles. It may be tempting to dig in and focus solely on coursework and research; after all, that's what you're there for. But most successful graduate students recommend striving for a little more variety than that.

Chemists with whom I spoke encourage students to spend time building relationships, both inside and outside of the university, to prioritize healthy activities such as exercise or sports when possible, and to remain flexible and open with advisors for when (not if!) surprises pop up.

"One regret I have heard from others and that I also feel is that many people put their life on hold while in graduate school. In my own case, I purposely waited until I had an exit date before I even considered marriage and the possibility of a family. Now I wish I'd started sooner, or at least while in graduate school," says one chemist.

Of course, relationships can be tricky. While another chemist notes that many married graduate students seemed more stable and secure than their single col-



PROFILES

inChemistry spoke with three chemists about some of their challenges balancing life and graduate school, and solicited their advice.

MEGHAN KNAPP, who earned her Ph.D. in chemistry in 2006, started graduate school after teaching high school for three years. By the time she started graduate school, she'd been married for two years and owned a home. She had her first daughter the summer between her second and third year, and her mother was diagnosed with breast cancer several months earlier. Two and a half years later, her second daughter was born — right before her dissertation defense.



iC: What were some things you did well in balancing graduate school with the rest of your life? Any recommendations?

MK: I wanted to stay plugged in with the other grad students, especially since I wasn't going to be on campus as much. We invited them over to our house a few times, and I made sure to stay involved socially with the other grad students as well. This really helped to create a support network on campus. I found other "nontraditional" grad students, as well as others who were considering getting married.

One of the key things is to select an advisor willing to work with you. I interviewed several advisors and mostly discussed their research, but I also tried to get a sense of the expectations of hours spent on campus and flexibility. Some types of research are going to demand that you be on campus at odd hours. Fortunately, I was

able to find research I loved that I could do mostly during the day. Of course, that meant I couldn't wait until 10 to come in; I had to be there early if I wanted to go home early.

I tried to keep realistic expectations about what I could do and to be very upfront with my advisor. Communication is really key. When we had to change daycare centers on short notice, I knew that would affect my work schedule. Even though my advisor wasn't over my shoulder every moment of the day, I didn't want to miss work without letting him know why. I also let my advisor know right away about my mother's condition. That way, when I needed to go out of town for her surgery, I was able to take care of things smoothly rather than dumping it all on him at once.

In response to requests from several graduate students, the department worked on a policy to handle pregnancy and maternity leave. I tried to arrange things on my own for my first pregnancy, but it

continued on next page

leagues, the stresses of graduate school can undoubtedly strain relationships. Not every nonstudent partner will understand the demands of graduate school, but many will. "I really need to give credit to my husband," says Meghan Knapp, who had been married for two years when she started graduate school. "I really made sure he was on board with my returning to school, so it was a family decision.... He really helped me to stay sane!"

Several chemists urge students to carefully interview advisors and labs before making decisions. "Interview potential advisors over and over again, and talk to people in the group," advises Daniel Lutterman. "There are lots of good projects, but you want to be sure that you are a good fit for the lab environment." Christopher Pollock, a second-year graduate student at **Cornell University**, agrees. "From my experience, your choice in advisors is critical to how flexible you can be in grad school." Deciding early on that you are committed to a balanced life while in graduate school means that you will be more likely to choose an advisor and a lab environment that will be supportive of that.



COURTESY OF CLEMSON UNIVERSITY

Another chemist suggests that students make time to build relationships with more than one professor in the department. "Get to know at least two other professors in the department really well. You always need three letters of reference later on anyway," he says.

Several chemists mention intramural sports and exercise as key parts of their life in graduate school. For other students, maintaining a favorite hobby — photography or music, for example — was a priority. Students who are involved in regular exercise, sports, or other activities have a natural release valve for stress and build a supportive network of friendships outside of the lab. "It is important to take care of yourself," says

Knapp. "That means getting exercise or doing something relaxing to help relieve the stress."

Of course, there is a limit to the number of plates even the most accomplished acrobat can spin. Some semesters, two plates will be plenty, and you'll pat yourself on the back for keeping just those two aloft. Other semesters, you'll be



SOUTHEASTERN EXPEDITIONS, INC.

Christopher Pollock in the lab and taking some time out to enjoy a whitewater rafting adventure with friends.

PROFILES *continued*

would have been much better if the policy were already in place. Finding an ally with some authority can really help make changes. While some may be more sensitive to your needs, professors who haven't gained tenure may be reluctant to make waves.

Before **ANDY KIDWELL** graduated with an M.S. degree in chemistry in 2002, he had decided early on that completely immersing himself in graduate school wasn't going to work. He also made sports a priority, playing on recreational and intramural basketball, softball, and football teams. When his advisor accepted a position at another university, he chose to move with him and, in the process, gained some valuable insider experience in moving and setting up a lab.

iC: How did you balance graduate school with your other interests? Can you share any lessons you learned?



AK: To me, it was very important to have friends to socialize with from inside my department and school. It was equally important to nurture friendships outside of school, for many reasons; I spent a lot of time building those relationships, many of which are still active today.

iC: Looking back, what do you wish you'd done differently? What advice would you offer?

AK: Moving during your graduate studies is an extra burden. If, during your career, you need to set up a lab, having such an experience can help you know what really needs to be done when so you can maximize your time.

However, moving will cost you valuable research time. At some point, you have to just pack as well as possible and let the movers do their job. On the arrival end, the goal should always be to unpack and get back up as fast as possible. Don't let it cost you too much time.



DANIEL LUTTERMAN received his Ph.D. in chemistry in 2007. He got married the summer before graduate school, and his children were born while he was in school. Having played baseball in college, sports were a priority outlet for him as well.

iC: How did you succeed at balancing graduate school with the rest of your life?

DL: Put some time into trying to relax. I see a lot of graduate students who work from dusk 'til dawn. The results come a lot easier when you learn not to stress so much!

iC: Looking back, what do you wish you'd done differently?

DL: I wish our families had been closer to Ohio State. We were both separated from our families and, since we had our children in graduate school, it would have been a lot easier if we had not been living so far apart.

willing to pick up two or three more. The key is knowing when two is enough and, when you have space for more, always being as graceful as possible in the transition.

For the acrobats, the applause doesn't come until the end of the performance, when the dancers drop their plates and poles and the audience lets out its collective breath and cheers. In grad school, don't forget that there *is* an end. You *will* drop

those plates with a soul-satisfying crash... and then walk off the stage, hopefully to thunderous applause.

As you consider what is worth your time and energy, remember that graduate school is only temporary. Don't neglect life-long pursuits — be they relationships or hobbies — because of this fleeting performance. While spinning extra plates may take a bit more concentration, you will be glad at the end that you put forth the effort to do so. **iC**



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ALLISON PROFFITT is a writer and editor based in Singapore and covers science all over the world. When she's not writing, she's traveling as much as she can.

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Voices of Experience

COMPILED BY THE OFFICE OF GRADUATE EDUCATION

Reprinted from "Graduate Students and Postdocs Share Their Top Tips for Grad School Success,"
Graduate Student Bulletin, June 2010; www.acs.org/grad



Keeping a Balance in Your Life

Just the other day, a friend was introducing me to a few new acquaintances and jokingly said, "Yes, she has a PHD: **Permanent Head Damage!**" We all laughed, but let's face the fact — graduate school is tough. After four to five years (or even longer) of arduous labor in the lab and relying on more failures than successes to round out an independent

thesis, it is hard not to lose some form of sanity along the way. I have, based on my own experiences, concluded that like all other challenges in life, the hardships of graduate school can be conquered by following a few simple guidelines.

First, being in graduate school does not mean you have to put your social life on hold. In fact, it is really important to establish a strong circle of friends that you can turn to for support and encouragement when things get tough. Besides, it is never too soon to start networking! You may need it when you start looking for a job. Second, take the time to do something meaningful or that you enjoy outside of work. Volunteer at the local food pantry or take up ballroom dancing. It will make you a more interesting person.

Last, update your résumé once in a while. Taking stock of what you have done helps you to stay on top of your goals. Planning is crucial when trying to minimize stress. So don't lose your mind. Follow these simple steps and surviving graduate school will not be as difficult as you think!

— Posted by Amanda



Networking: What I Learned from My First Experience

I have always been an outgoing person... except when it came to networking. I wasn't sure why it was important, who to network with, or what to talk about.

That changed when I attended a career-related symposium at my first ACS regional meeting. During the break, I happened to talk with two industrial chemists and mentioned that I was considering starting a student committee related to our topic of conversation. They kindly asked all about it, encouraged me to go for it, and e-mailed me afterward with useful resources. A few days later, I realized I'd been networking! Several years later, I also realized that this interaction indirectly led me to my ideal career path.

In addition to finding my career direction, that experience taught me three things about networking:

Even students need business cards — they're the admission ticket to the networking club.

It's important to establish professional contacts both within and beyond your research area, so make time to attend talks

and receptions on campus and at conferences in addition to the usual research presentations. The chemistry community is relatively small; you never know when a contact will lead to a valuable opportunity. *Every job offer I've received came directly from networking.*

Networking doesn't have to be intimidating. Most people are interested in talking with and helping junior colleagues. Be yourself, be professional, and practice — it does get easier!

And those two industrial chemists from my first conference? They're *still* in my network.

— Posted by Shannon



Keeping an Open Mind

When I came to graduate school, I knew what I wanted to do. I was sure of where my career would lead me, and I loved the field in which I was going to work. I began my research right away in my first semester and was excited about all the possibilities I had in front of me. However, by the end of my first year, things had changed dramatically. My

advisor was leaving. I was faced with a big decision: find a new advisor or find a new Ph.D. program.

I never thought I would be faced with this decision; I had everything planned perfectly, and I had worked hard to succeed in my field. At first I was devastated and unmotivated, but I finally decided to stay in the program I was in and to pick a new advisor in a new field. I went from bioorganic chemistry to inorganic chemistry, and today I could not be happier with the choice I made. I was forced to look at options I would have never considered in the past; in retrospect, these options were opportunities.

The best advice I can offer anyone in graduate school is to keep an open mind and jump on opportunities as they present themselves. You never know where change might lead, and you never know what great things change can bring along the way.

— Posted by Beatriz



Taking Advantage of Informal Guidance Opportunities

Well, here I am, three months out from my thesis defense, and finally, in the last nine months or so, I've felt like I have things under control. In some regards, that took way too long; in others, that's probably why it takes more than a few years to get a Ph.D.

It's funny to look back on how your approach to research (and life in general) changes over the course of graduate school. Personally, I was way too uptight at first. Data had to be perfect, I tried to keep current on way too



many journals, and I even thought I was so busy that I would turn down the older guys down the hall when they asked if I wanted to go out to lunch. I thought I couldn't spare an hour for a leisurely meal and would instead just plow through lunch, dinner leftovers in hand, while I tried to get some work done on the computer.

After a couple years, I finally got sick of my cooking and started going out with the guys, who at that point were getting close to finishing. I quickly realized that in between small talk and jokes, I had been missing their conversations about thesis writing, postdoc searches, and research ideas. As I approach the end of my graduate studies, I can only imagine how much harder it all would have been without the informal guidance I've received from some older friends.

— Posted by James



Discovering a Recipe for Success

While it's true that different environments (school, area of study, degree) contribute to vastly different experiences in graduate school, I believe there are a few things that can help make every student successful.

I learned during my own experience that both scientific and nonscientific communication is vital for success. The ability to com-

municate with your advisor, other professors, your peers, and (gasp!) even strangers at a conference will be a practical skill long after graduate school has ended.

Next, I believe that a successful approach includes a strong work ethic. Obtaining those much-needed results is a grueling task and requires a large degree of perseverance and diligence. A strong work ethic is an invaluable tool that helps shape a budding career and, as an added bonus, can be highly contagious.

Last, I found that some time away from lab provided relief from the intense focus that graduate school demanded. For me, this included sports, such as softball, volleyball, and running, as well as cooking and baking. For others, this can include volunteering, music, community activities, or happy hour at the pub. Finding a release is an important way to help refocus in the laboratory or classroom.

These are just a few suggestions that worked for me. In the end, there is no magical solution to succeeding in graduate school. But if you begin with hard work, throw in some communication and a dash of recreation, I think you will find a recipe for success!

— Posted by Shelli



Research and Networking

As a postdoctoral fellow interacting with and mentoring graduate students at the University of California, Berkeley, here are a few thoughts that could help the present graduate students. I am going to focus on two things — interdisciplinary research and networking!

The significance of research across boundaries of different aspects of science has increased manyfold. What this entails is exploring, learning, and mastering more skills (traditionally, the focus was on one topic/subject) in the normal time frame of graduate school (5-6 years). This will help prepare you to be more competitive, and you will definitely have more career options after grad school. I want to emphasize this point because of the changing face of big pharmaceutical industries and the emergence of biotech and other related industries, along with government, which are looking for scientists with expertise in a broader arena of science.

Once you've picked your advisor, decided on the research topic, and gotten through qualifiers, one important thing you should be looking at is NETWORKING! Most of us wait 'til we are about to graduate and hope that our mentor will be able to place us somewhere after graduation. Your research advisor should not be your only connection to the scientific world! Nothing against graduate advisors, but I personally feel that you need to have mentors other than your graduate advisor and your committee to guide you to pursue your career goals. Try to actively pursue researchers who are willing to guide you professionally. One important place to network is at the national conferences, where you can efficiently network and develop professional relationships, which are very important.

To be successful during and after graduate school, students should make a conscious effort to develop the necessary skills, which include both scientific and social aspects.

— Posted by Naresh

AMANDA LEE has successfully survived graduate school and is currently a postdoctoral research fellow at City of Hope Beckman Research Institute. **SHANNON WATT** earned a Ph.D. at the Georgia Institute of Technology and is now an NSF Discovery Corps Postdoctoral Fellow at the University of Michigan.

BEATRIZ E. RIOS is a fourth-year graduate student at Southern Methodist University. In her spare time she enjoys cooking, triathlon, and rugby.

JAMES O'DEA is a graduate student at the University of California, Santa Barbara, and is wrapping up his dissertation on scanned probe techniques to study proton exchange membranes.

SHELLI WAETZIG earned a Ph.D. from the University of Kansas in 2007 and recently completed postdoctoral research at the University of California, Irvine. She is now a visiting assistant professor at College of the Holy Cross in Worcester, MA.

NARESH SUNKARA is a postdoctoral fellow at the University of California, Berkeley.

DO YOU FLEX YOUR STYLE? No, this isn't a question about how you wear your clothes — I'm asking if you're flexible with your communication style.

Did you every wonder why some people you encounter are easy to get along with, while others just drive you crazy? Often it's because people have different communication styles. Your response to these various styles might one day be important to your collegiate, professional, or personal success.

Early on in my career, I was a very direct, right-to-the-point communicator — no sugarcoating for me. Unfortunately, I didn't realize until I started in my first professional position that not *all* people communicate this way. In fact, I learned that not only do some people prefer different

communication styles; to some people, *my* style of communication can come across as abrasive! Quite frankly, my communication style was having a negative impact on my career.

Luckily for me, my boss suggested I attend some training to better understand the concept of communication styles. In this training I learned about my preferred communication style and also my backup style when I was in conflict. I learned how to identify the communication styles of those around me, and how to modify or flex my style to achieve better results. And you can, too.



People styles at work

The training course I took was based on the now-classic book written by Robert Bolton and Dorothy Grover Bolton, *People Styles at*

Work. This book is a step-by-step guide that teaches how to recognize others' preferred communication styles. It also explains how to slightly adjust or flex your own style to build better relationships. I've since facilitated this type of training for numerous corporate and academic teams, and I can say that having a model for understanding communication styles is an extremely valuable tool for success!

Try to focus on preferred *behaviors* — not an individual's personality or attitude. Carefully evaluate the specific behaviors you observe in others (such as how fast they talk, how directive they are, or how aware they are of others' feelings), and then slightly adjust your own behaviors to be more similar. Doing this will help you to ultimately get along better and work more effectively with others, whether you're doing research with a professor or working on group projects with fellow students in college. Later on, when you enter the workforce, these skills will be useful for completing projects for your boss or working with other members of your team.

The authors define four styles: analytical, amiable, expressive, and driver. I'll describe each of them briefly — but please keep in mind I'm simplifying the descriptions significantly. Also, remember that a person's talents or skills can be very different from his or her communication style. In other words, while many scientists possess strong analytical skills, they may not necessarily be analytical communicators.



Are People Hearing What You're Saying?

Understanding Communication Styles to Build Better Relationships

BY LISA B. MARSHALL



The analytical communicator

The analytical communicator prefers data and facts. Details and accuracy are very important. Analytical people are typically described as being systematic, well-organized, and deliberate. They want facts and information presented to them in a logical manner, and they

don't mind spending extra time to make sure things are right. Others may describe the analytical communicator as being overly cautious or structured, or as someone who does things too much "by the book." If I had to choose a single word to describe this style of communicator, I'd choose "details."

The amiable communicator

Next is the amiable communicator. Amiables focus on maintaining relationships with people and are natural peacemakers. A person who prefers this style is a team player and doesn't seek the spotlight. On a team, the amiable gets along with everyone and tries to ensure that everyone else is getting along as well. They are dependable, loyal, and easygoing. They like things that are nonthreatening and friendly. They hate dealing with impersonal details and "cold, hard facts." Amiables are often described as warm and sensitive to people's feelings, but at the same time, others may see them as "wishy-washy." All teams need at least one amiable. The single word I'd choose for amiables is "feelings."

The expressive communicator

Expressives are good at grasping the "big picture." They are very outgoing, are enthusiastic, and possess a high energy level. Expressives are great idea generators but usually do not have the ability to see the idea through to completion. They are also usually slow to reach a decision. They enjoy helping others and are particularly fond of

socializing. This style is the most outgoing, flamboyant, energetic, and spontaneous. The single word I'd choose for expressives is "perceptions."

The driver communicator

Finally, drivers are very results-oriented and direct, practical, and impatient. They thrive on the thrill of the challenge and have a high motivation to succeed. They are "doers" who generally talk fast and are direct. Drivers are often seen as being decisive, to the point, and pragmatic. They focus on the bottom line. They don't like to waste time on personal talk or preliminaries. Other styles sometimes perceive drivers as being dominating or harsh in pursuit of a goal. To sum up drivers, I'd choose the word "results."

Communicate better with different types

To recap, the four styles we've discussed above are analytical (details), amiable (feelings), expressive (perceptions), and driver (results). The main idea I want to stress is to learn the four styles and the associated behaviors so that you can "flex on the fly." If you are able to quickly identify someone's communication style, you will know the best way to interact with that person. For example, if you are a "driver" and you need to provide information to an "analytical," you'll know that it's important to slow down and take extra time to not only provide a summary but also

provide details of the information requested. And then give the person time to think through the information before requesting a response.

Again, I am simplifying quite a bit; clearly, not everyone is only one style. We are often a combination of styles — but we do tend to have one dominant communication style that we use day-to-day. Recognizing the pros and cons of your specific style and the styles of those around you can help you communicate more effectively with others and achieve better results when collaborating.

When I ask someone, "Which style do you think is the best?," almost always the person will identify his or her preferred communication style. So perhaps the most important lesson to be learned here is that there is no one "best" style. Each style has characteristic strengths and weaknesses not shared by the others.

Throughout my career, I've found this model extremely helpful for creating a quick communication style profile. It has helped me in both professional and personal situations to quickly understand people and build relationships. The Boltons summed it up nicely:

Whether at work or at home, success and happiness involve relating to others across a chasm of significant behavioral differences. Clearly, if you could figure out how to bridge the gap between yourself and others, you could make your own life — and theirs — much easier, happier, and more productive. IC



LISA B. MARSHALL is a communication expert, author, and professional speaker.



Informing and Preparing Young Chemists

How the ACS Office of Graduate Education can help you

By JOE Z. SOSTARIC AND CORRIE KUNIYOSHI

IF YOU DECIDE TO PURSUE graduate studies in the chemical sciences, you will find very distinct differences in what is expected of you as a graduate student versus when you were an undergraduate. Greater personal responsibility will be expected of you — first, relating to your studies and your research work and, later, with regard to your status as a freshly minted master's or Ph.D. chemist.

You'll also find differences between the types of ACS offerings and programs offered to you as a graduate student compared with those programs you may have experienced with the ACS Undergraduate Programs Office. To help you successfully adjust to this transition, this article will introduce you to the offerings managed by the ACS Office of Graduate Education (OGE) and give you a few tips on how best to access and make use of the many programs and resources of OGE.

Access online resources now

Our webpage, www.acs.org/grad, should be the first place you go as a future graduate student to find the most relevant and useful information. Here, you'll find information on how to plan for and find the right graduate school, links to grants and fellowships, informa-

tion for international students coming to study in the U.S. from abroad, and an access point to the programs and resources offered by OGE.

The *Graduate Student Bulletin* is e-mailed monthly to subscribers. Once you sign up for this free online publication, make sure to take the time to read the feature articles and check out the list of resources. The information will help you gain a broader perspective on the chemical world around you, especially as it pertains to graduate students. The bulletin also includes sections listing opportunities, science news, and meeting announcements. (See current and past issues at www.acs.org/gradbulletin.)

Connect with other graduate students

The ACS Graduate Students group on Facebook will help you connect with other chemistry graduate students. This group provides an excellent forum for networking with other chemists at similar points in their careers and for keeping in touch with OGE. Our postings will provide you with regular updates on topics and programs that are timely and relevant. You'll also

receive invitations to special events at ACS national meetings and be eligible for thank-you gifts for participating in our surveys. To access the ACS Graduate Students group, go to www.facebook.com and search for "ACS Graduate Students."

The Grad Student and Postdoc Reception is held at every ACS national meeting, usually from 6:30 to 8:00 p.m. on Monday, just before the popular poster session, Sci-Mix. The reception held at the spring ACS national meeting in San Francisco attracted well over 500 graduate students and postdocs, who enjoyed

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an evening of complimentary refreshments, opportunities to network with ACS Technical Division representatives, and a chance to win one of two top-of-the-line Apple iPhones.

Plan your career

Depending on your particular situation as a graduate student, the responsibility of preparing for career success may fall largely or entirely on your shoulders. The two-day Preparing for Life After Graduate School workshop (www.acs.org/gradworkshop) is organized by OGE with the support of a host chemistry department, and provides senior graduate students and postdoctoral scholars with information on career options, tools to obtain positions, and career-launching strategies. This unique workshop will enable you to:

- Examine careers for Ph.D. chemists
- Get to know the critical non-technical skills that employers look for in a candidate
- Find employment opportunities
- Prepare for academic positions
- Learn to put this knowledge into practice.

Getting hired for a faculty position takes more than meeting the basic requirements. The Academic Employment Initiative poster session (www.acs.org/AEI) held at every fall ACS national meeting allows senior graduate students and postdoctoral scholars to showcase their teaching and research goals to university recruiters, while networking with faculty and fellow candidates. OGE heavily promotes this program to faculty recruiters, since their participation is crucial to the event's success. At the AEI poster session, candidates seeking faculty positions present posters summarizing their research interests, teaching philosophies, and experience to faculty recruiters in an informal setting. Before attending the AEI poster session, recruiters and participants have the opportunity to view candidates' profiles (available at www.acs.org/AEI beginning in early July), giving them ample time to decide which candidates they

Ask Your Department to Host a Workshop!

Help Spread the Word! The Preparing for Life After Graduate School workshop provides invaluable information on the job search and recruitment process, and OGE wants to partner with your department and/or graduate school to bring this resource to you.

For more information, contact Joe Sostaric at j_sostaric@acs.org or at (800) 227-5558, ext. 8734.



LINDA WANG/CS&EN

want to meet and evaluate at the AEI event at the fall ACS national meeting.

Get involved!

OGE is committed to building a strong graduate student chemistry community through these programs and activities. However, because the decisions you make as a graduate student may have long-ranging implications later in your career, the responsibility for your success will fall mostly on you.


Given this fact, you cannot afford to wait for opportunities to come knocking on your door. Start planning for your success early! Become involved with groups within ACS, such as the Younger Chemists Committee, your local section, and technical divisions. Seek out mentors, network with your fellow students and with other chemists at ACS national meetings, and most of all, make sure you know how to go about starting a successful career.

Stay involved

The period in your life when you must take a proactive role to get what you need to be successful begins now. OGE has the programs and resources that you'll be looking for, but we need to hear your voice and the collective voice of your fellow students and postdoctoral colleagues to deliver many of these services to you.

Be sure to stay in touch with us and your graduate student community so that your needs can be met. Indeed, whether you're an undergraduate student considering graduate school or you've already taken that step,

join the ACS Graduate Students group on Facebook today and leave a post on the wall to let us know that you've arrived! We'll be glad to see you there!

If you have any questions about the programs and resources available through the ACS Office of Graduate Education, or any comments or concerns, do not hesitate to share these with us at GradEd@acs.org. We look forward to serving you! 



JOE Z. SOSTARIC is Program Manager in the ACS Office of Graduate Education. He obtained his Ph.D. in chemistry in 1999 at the University of Melbourne, Australia, and has worked in scientific research, consulting, and graduate education. **CORRIE KUNIYOSHI** is a Senior Education Associate in the ACS Office of Graduate Education and Editor of the *Graduate Student Bulletin*. She obtained her Ph.D. in chemistry from the University of California, Los Angeles, in 2005.

Meeting and Learning by the Bay

Some favorite experiences at the ACS national meeting in San Francisco

By ANGIE AMICK

This past March, more than 2,000 undergraduates were privileged to travel to San Francisco for the undergraduate program at the 239th ACS national meeting. ACS student members from across the country converged for two days to participate in undergraduate program events. This provided them with time to network, develop possible long-term professional contacts, and explore an amazing city! These two days were filled with graduate school recruiting events, chem demos, and even entertaining talks about the chemistry of wine and chocolate.

Sunday, March 21 Off to a great start!

To start off the two-day stretch of events, ACS hosted a breakfast in the hospitality room where students could grab a quick bite to eat, chat with fellow members about the activities for the day, and listen to a panel of students and faculty advisors at "Making the Most of Your First ACS Meeting." The panelists shared a variety of tips on places to go, people to see, things to do, and more.

Wine has chemistry?

If anyone had any doubts as to whether undergraduates would be interested in a lecture about wine, they quickly received an answer. This technical symposium was standing-room-only. Many people drink wine, but do they really understand the chemistry behind it? In these three presentations, M. Sarita Cardoza, John Thorngate, and James Kennedy provided a quick view of the production of wine — from the beginning, with grapes and tannins, to the end, when the bottled wine hits the shelves in stores.

Chem Demo Exchange

Continuing a long tradition, Chem Demo Exchange was a hit in San Francisco. Members of more than 30 ACS student chapters networked with one another and shared ideas for easy experiments using household chemicals. There was everything from "oobleck" to artificial snow. This program offered a fun and exciting way for student members to trade stories and offer advice

The Student Chapter Awards Ceremony celebrated the accomplishments of more than 250 chapters.

about their outreach trials and triumphs.

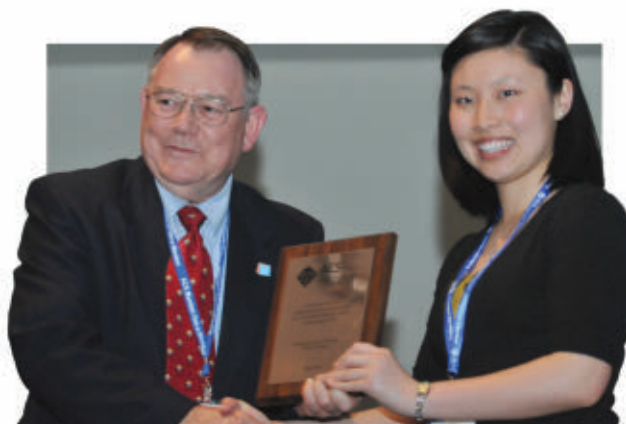
Graduate school? Me?

Anyone who has ever wondered, "Is graduate school really for me?" really missed out if they did not attend the Graduate School Reality Check, followed by the Networking Social for Graduate School Recruiters. The panel at the Graduate School Reality Check, consisting of Ph.D. and master's level professors, program representatives, and students, shared their experiences and let everyone know that graduate school isn't for the faint of heart. They also provided strategies for ensuring a successful graduate school

experience. Afterwards, undergraduates had the opportunity to mingle with representatives from a wide variety of graduate programs. And a few lucky students left with tentative offers in hand.

Let's party!

Finally, the evening arrived — and all the hard work put forth by the members of ACS student chapters was officially recognized and celebrated! The 2008-2009 ACS Student Chapter Awards Ceremony was an amazing part of the undergraduate program. More than 250 chapters were recognized with Outstanding, Commendable, and Honorable Mention awards, and twice as many Green



CHRISTINE SCHMIDT/ACS



Members of the ACS student chapter from Central Michigan University with ACS President Joe Francisco.

Chemistry chapters were honored this year compared with the previous year. And that was just the beginning. Everyone in the know eagerly anticipated the Undergraduate Social that followed the awards ceremony. A special thanks goes to the University of San Francisco ACS student chapter for providing an amazing night of beaker-filled aquariums and a plethora of food, music, and networking. What a way to end day one of the undergraduate program!

Chocolate!

Who wouldn't flock to take advantage of free samples of chocolate at 9:45 in the morning? By the end of this standing-room-only event, the crowd left knowing a lot more about the chemistry behind chocolate. I'll leave those of you who missed the talk with two random facts I learned: first, Americans consume on average 11 pounds of chocolate per person per year; and second, eating dark chocolate two times a week or more



ACS student chapter members from the University of Puerto Rico-Aguadilla at the Chem Demo Exchange.

Monday, March 22

Mmmm... breakfast!

Even after the late night, the Graduate School Breakfast still buzzed with activity. This was another chance for students to chat with graduate school recruiters while grabbing a bite to eat and planning the day's activities.

reduces your risk of a heart attack by 70 percent. What are you waiting for? Enjoy!

Posters, posters everywhere

More than 1,100 posters were presented at the Undergraduate Research Poster Session. This program

was three hours long, with hundreds of visitors. What an amazing way to network and show off the hard work these undergraduates have done!

Energy!

There could not have been a better way to bring the two-day undergraduate program to a close than by listening to this year's Eminent Scientist, Daniel G. Nocera. He is probably most recognized as a leading researcher in renewable energy at the molecular level. Hopefully, in years to come we will hear more about the alternative energy sources that he is working on.

Networking and mentoring

The Undergraduate Networking Session with Industrial Chemists gave us an exciting opportunity to sit in small groups and chat with accomplished industrial chemists who represent the ACS Committee on Corporation Associates. We learned about their career paths in industry, and they provided some great advice to help us forge our own paths. Oh, and the food was great, too!

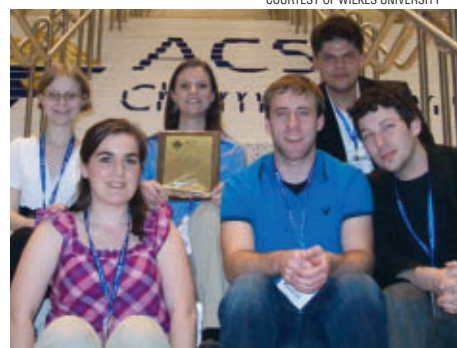
Sci-Mix

What a way to close the undergraduate program of the 239th ACS national meeting in San Francisco. Sci-Mix was a wonderful opportunity to

navigate through the largest poster session of the national meeting, see what makes a successful ACS student chapter, and browse the divisional posters and other exhibits!

In the end...

The undergraduate program of the 239th ACS national meeting in San Francisco was a huge success. No one could have left this meeting without having gained something that will help with their future endeavors, whether it is performing a new experiment for community outreach, being one step closer to choosing a graduate school, or understanding new areas of chemistry.



Members from the ACS student chapter at Wilkes University enjoying a quiet moment in San Francisco.

For those of you who were unable to attend, I challenge you to come to future national meetings. Scared? Don't be. In the words of a fellow meeting attendee, "At these meetings the 'geek factor' is gone — you're surrounded by thousands of other people with the same interests as you." See you at a future meeting! **IC**



ANGIE AMICK is a senior at Newberry College, where she is pursuing a degree in biology and nursing with a minor in chemistry. She plans to graduate in May 2011.

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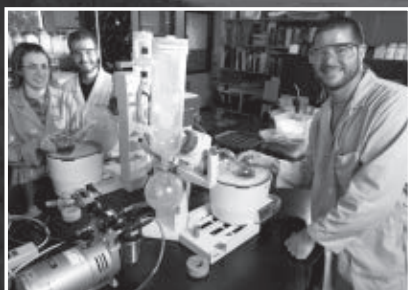
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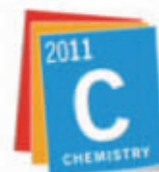
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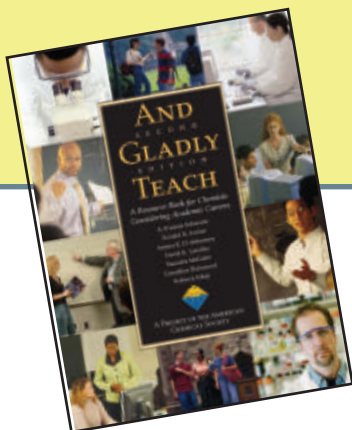
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