218th 2YC$_3$ Conference

Chemical Education:
Past, Present, & Future

DURHAM TECH

November 3-4, 2017

218th $2YC_3$ Conference
"Chemical Education: Past, Present, & Future"
Durham Technical Community College
Durham, NC
November 3-4, 2017

Planning Committee

Program:	Mark Matthews, Durham Technical CC
Local Arrangements:	Olga Hogrefe, Durham Technical CC
Exhibits:	DeeDee Allen, Wake Technical CC

$2YC_3$ Executive Committee (COCTYC)

2017 Chair	Kathy Carrigan, Portland CC (OR)
Chair Elect 2017	Mary Roslonowski, Eastern Florida State College (FL)
Chair Elect 2018	Peter Larkowski, Delta College (MI)
Online Conference Coordinator	Tamika Duplessis, Delgado CC (LA)
Membership & College Sponsors	Jason Jadin, Rochester C&TC (MN)
DivCHED Representative	Neil Bastian, Salt Lake City CC (UT)
Treasurer	Julie Ellefson-Kuehn, Harper College (IL)
Workshops Liaison	Amy Jo Sanders, Stark State College (OH)
Industrial Sponsors Chair	C. Michele Turner, U. of Akron-Wayne College (OH)
Future Sites Coordinator	Scott Donnelly, Arizona Western College (AZ)
Newsletter Editor	Jonathan Gittins, Delta College (MI)
Webmaster	Luca Preziati, Leeward CC (HI)

Conference Exhibitors:

Cengage
Carolina Biological Supply Company
Hands-On Labs
Knewton Adaptive Learning
MicroLAB, Inc
Morton Publishing Company
Verneir Software and Technology
W.W. Norton & Company
For a complete list of $2YC_3$ Industrial Sponsors, visit 2yc3.org

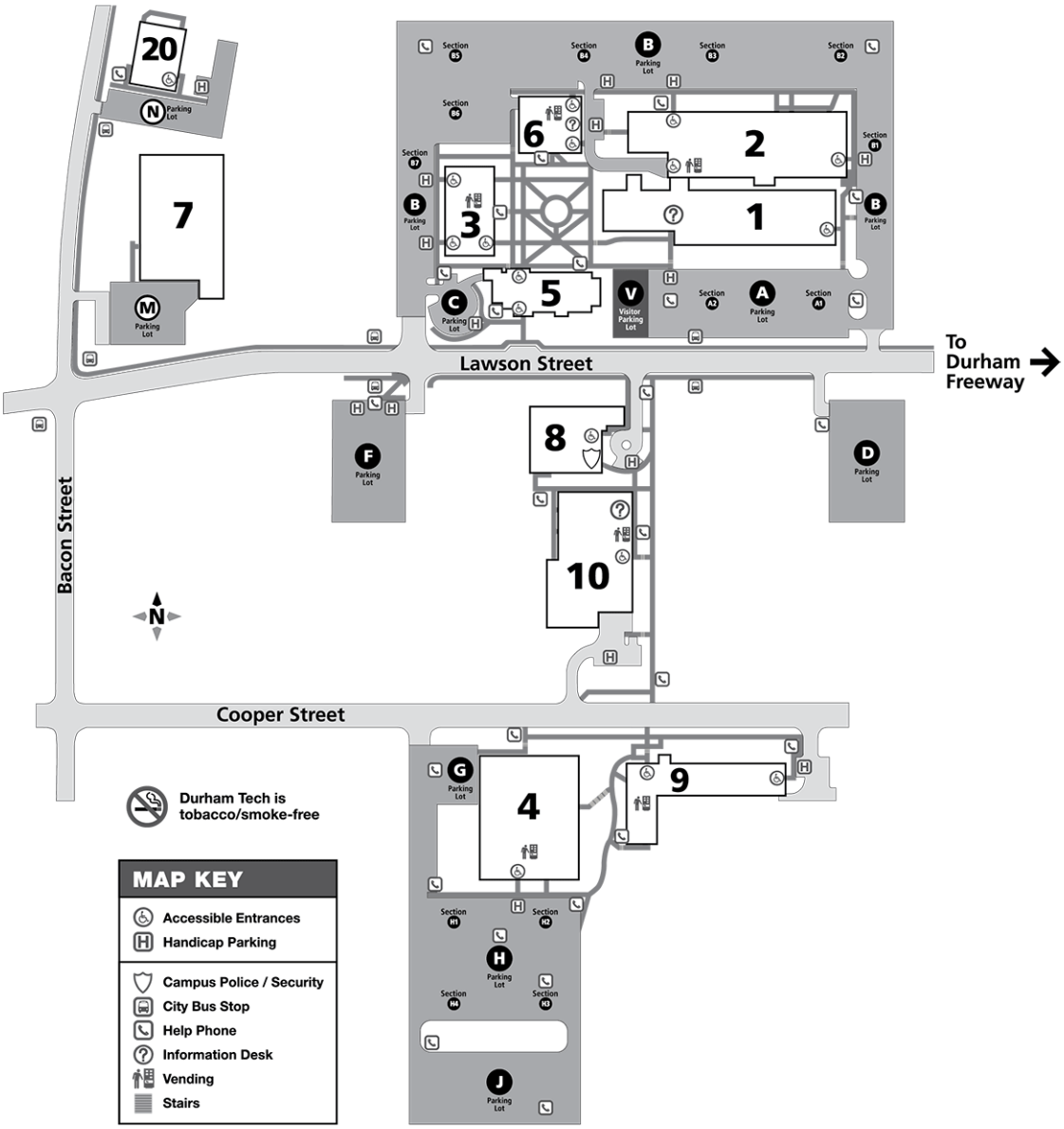
Special Thanks:

Toni Brown – Administrative Assistant (Arts, Science, & University Transfer)
Liz Filipowski – Webmaster
Gretel Guest – Biology Instructor
Carolyn Henderson – Administrative Assistant (Math & Science)
Bill Ingram – President
Steven Leadon – Biology Instructor & Interim Science Chair
Scott Rubin & McGraw-Hill
Scott Stauble – Biology Instructor
Dorothy Wood – Biology Instructor

Campus Map

Notes:

- The conference will be held in the Collins Building (2), except for lunches and the Friday evening banquet, which will take place in the Wynn Center (10)
- Parking in Lot B (adjacent to Collins) is recommended.



Past...

FUTURE DIRECTIONS OF THE GENERAL CHEMISTRY LABORATORY

Robert Plane
Cornell University, Ithaca, New York

(This is a summary of a recording made of Dr. Plane's presentation. Ed.)

It is much harder to teach beginning chemistry than to teach beginning physics or beginning biology.

The reason for this is that the students just do not care about chemistry. Today, students have an interest in the color of leaves or in the nature of animals so the biology teacher has something to build upon. Students also have an interest in cars and things like that and thus have a latent interest in physics which the physics teacher can build upon. It may be a matter that we do not sell enough Gilbert chemistry sets anymore or just do not have any basis for interest in chemistry anymore. We have to create the problems in order to solve them and this creates a very artificial situation and many students resent this. That is, as I see it, the first problem we face - the nature of our subject.

The second problem that we have to solve is not unique to our subject. I believe that, today, chemistry is undergoing a real revolution as one age of chemistry is about to come to an end and a new age is almost upon us. We have barely caught up with the ending age of chemistry in chemical education. The present age is one I like to call Status Chemistry where we are learning about the structure of molecule. Now, we are ready to move on to the reactions or the dynamics of chemistry. We are also ready to move on with chemistry to be used as the basis for biology. Both of these developments are factors which will have to be reflected rather quickly by the teacher of beginning chemical education courses.

We must treat our subject clearly and fairly to the students. We must be completely honest with them. The basis of our subject is that it is a laboratory science. The only way we are going to get students to understand our problems and get them excited is to get them doing experiments to see what chemistry really is. Twenty years ago, chemistry was largely industrial chemistry and we primarily covered descriptive chemistry. Since then, we have introduced theory into the beginning chemistry course, and many people agreed that this was much easier and much better than requiring extensive memorization.

The theoretical aspect of chemistry has moved well, but unfortunately this is rather sterile. It has not helped the student at all. He does not see the problem any more clearly when we talk about orbitals than when we talk about balancing equations for the Bessemer Converter. The point is that the student still does not know <u>why</u> he is studying chemistry and the only way he is going to find an answer for this is to get into some interesting subjects and then he has got to get into the laboratory and do some experiments.

Now we are approaching the central problem because laboratory instruction has not changed at all in the past ten years. I doubt that it has changed significantly in the last forty years. Laboratory teaching has not kept pace with other advances. Students are now less able to do chemistry laboratory work than they were forty years ago. Then, most students had grown-up on a farm; they had fixed bicycles and other equipment. Today, they know how to run a television set and that is about the extent of their mechanical ability. We throw them into the laboratory, tell them to do an experiment and it does not work so well. The students do not work well and neither does the experiment. Today's students are less prepared but face the same old experiments which are not relevant and from this they are supposed to get some feeling for a laboratory science.

There have been various suggestions or proposals about how we can go about correcting this problem in chemistry. There are some proposals such as abolishing chemistry laboratories. There may be something to that, although, it may not solve the problem. Students hate the laboratory and find it to be a monumental waste of time, so why shouldn't we abolish the laboratory. But

if we do this, we throw out what I consider to be the most important part of the course and the reason for studying chemistry. So I hope no one takes this suggestion seriously - but then what do we substitute?

Someone has suggested that the laboratory will be completely replaced by the computer and that there will be some interface where the student would make contact with computer. I think we have to be careful at this stage so that we do not loose the real essence of our subject by finding short cut ways to alleviate some of the problems. I feel that the essence of chemistry is working with chemicals and getting a feel for the subject which cannot be short cut. The student must do work in the lab and it cannot be replaced by a computer. It must include wet chemistry, dry chemistry and all kinds of chemistry which must be explored if the student is to get any real appreciation for the subject.

One of the things that we must do is to really study chemical reactions. This will give us some real things to do in the laboratory that is going to be very close to genuine chemistry. As far as the biology orientation of chemistry is concerned, we will be helped because we do not have to quickly introduce this into the laboratory because the students already have some intere and have some curiosity to build upon. Experiments are already somewhat familiar to them in thi science area.

What is the ultimate solution to the notion that the laboratory is very important? In our Cornell catalogue, we have something called laboratory instruction, which is a misnomer if there ever was one. The student is given a book that has some blank pages in it and he is supposed to somehow do some experiments based upon his background. He is asked to fill in all the blank spaces and that is supposed to give him some feeling of chemistry. I think that it is about tim that we started facing up to the fact that the hardest job is to get the students into the labor tory and to do this in a constructive way, we will have to conduct some real instruction in the laboratory. We frequently spend three hours preparing a lecture, but whoever heard of spending three hours getting ready for a laboratory session? We would ask, "what do you do with all that time?" However, once you have the student in the laboratory, why not teach him? I do not want you to get the idea that I am against computers and teaching aids and all these things, but we should work with the students and help them get used to the laboratory.

There is a problem involving the use of the word, "experiment." An experiment usually involves something that the student does not care about, but they do it and usually do not get the expected results. Then they find what the expected results were and write that down. I think we need to eliminate much of what we are doing and use those experiments which enable the students to learn from doing and find out what is actually happening.

The only experiments we do that meet my criteria are those that have to do with analysis. This includes both qualitative and quantitative analysis. These experiments are sound and the student does not know the answer beforehand. He must show some ingenuity and he must learn something before he starts completing the blanks on the experiment sheet. I am fully in agreement with the introduction of qualitative and quantitative work as early as the end of the fres man curriculum. This would require the introduction of some instruments. However, much of chemistry is instrumental in nature and as long as the student can understand some of the principles of the instrument, I think it is fine. If the instrument can malfunction, so much t better. It should be able to be fixed conveniently and it should be something that the student can use and see how the particular properties are measured.

Dr. Robert Plane (Cornell University)
Proceedings of the 12th, 13th & 14th conferences, 1968
2YC$_3$ Archives

Present…

Friday, November 3rd

8:00 am – 2:00 pm **Registration**
Collins 2-178

Collins 2-164 **Coffee & Breakfast (Continental)**
(Lobby)

8:00 – 4:30 **Exhibits**
Collins 2-164
(Lobby)

9:15 – 9:30 **Welcome & Opening Remarks**
Collins 2-178

Friday Keynote

9:30 – 10:15 **Instructional materials that promote active-learning strategies in the classroom;** Maria Oliver-Hoyo, North Carolina State University, Raleigh, NC
Collins 2-178

10:15 – 10:30 **Refreshments**
Collins 2-164 (Lobby)
The Refreshment area will also be available between sessions.

Friday Session 1

10:30 – 11:15 **Forging an Unlikely Bond: Chemistry and English for STEM Majors**; Karen Dailey & Margaret King, Harper College, Palatine, IL
Collins 2-115
In an effort to try a different pedagogical approach to improve scientific communication skills, a learning community between a General Chemistry class and an English Composition class has been offered in this Fall 2017 semester. The goal of this Chemistry-English course link is to show STEM students the importance of communication skills—even in science fields. This course link uses problem-based laboratory experiments to bridge the gap between technical communication and that of English composition. The students are expected to develop technical writing skills side-by-side with their composition skills and to compare the difference between those "voices". The class is responsible for learning to write technical lab reports in the Chemistry-half of the link; while in the English-half, they utilize related STEM topics for their compositions. This presentation will describe how the cooperative Chemistry/English courses were developed: the assignments and activities, the assessment plan, and the preliminary results of this course link.

OR

Collins 2-129 **Online Chemistry with Lab: Where it is, where it has been, and where it is going**; Shayna Burchett & Jack Lee Hayes, State Fair CC, Sedalia, MO
State Fair Community College has been offering a completely online version of an Introduction to Chemistry with Lab since 2010. Over the lifespan of the offering, LMSs, reagents, equipment, and students have evolved. This discussion will focus on the successes, failures, and upcoming opportunities for growth in the program. Participants are invited to join an ongoing exploration of solutions for distance learning with labs.

Friday Session 2

11:30 – 12:15 **I Came Back to the Faculty for THIS?** Wheeler Conover, Southeast Kentucky CTC, Cumberland, KY

Collins 2-115

The presenter spent nine years as a chemistry professor at Southeast Kentucky Community and Technical College before serving 9 1/2 years as SKCTC's college's chief academic officer. He returned to the faculty three years ago and has spent the entire time changing everything from lecture and lab content to technology and teaching presentation. This talk will focus on what has changed, what has not, and what may be needed to keep two-year college chemists successful in the days ahead.

OR

Collins 2-135 **Take the frustration out of online homework and offer your students a personalized learning experience with Smartwork5;** Alison Haskins, W. W. Norton & Company

Created by chemistry educators, SmartWork5 is the most intuitive online tutorial and homework system available for general chemistry offering both an adaptive, personalized learning experience as well as the ability to assign problems of the professor's choosing. In minutes, an instructor can create an assignment that is automatically graded, giving students answer-specific feedback, effective hints, tutorials and links to an interactive Ebook. SmartWork5 allows the instructor to gauge her students' performance prior to lecture and can create more effective office hours. This talk will emphasize how instructors, students, and office hours can benefit from using SmartWork5.

12:30 – 1:30 **Lunch & 2YC$_3$ General Meeting**

Wynn Center Multi-Purpose Room (Wynn 10-103)

Friday Session 3

1:45 – 2:30 **Growing the Roots of STEM: Factors affecting the declaration and completion of a degree;**

Collins 2-115 DeeDee Allen, Wake Technical CC, Raleigh, NC

ROOTS of STEM is a quantitative and qualitative project investigating the institutional factors that influence women's and underrepresented minorities' decision to pursue STEM majors. The project utilizes a unique longitudinal dataset following one cohort of North Carolina public school students from middle school to high school and into the public university system in NC. An overview of the study and results of ongoing research on STEM majors will be presented in addition to preliminary implications for the chemistry major and the role of community colleges.

OR

Collins 2-135 **Flipping the Chemistry Class;** Peter Golden, Sandhills CC, Pinehurst, NC

Flipping the chemistry classroom has many advantages which have been documented by research. This round table would allow instructors to share how they are flipping the classroom, what is working, what isn't working, and what "tools" they are using to flip the classroom. We invite novice flippers, experienced flippers and those interested in flipping the classroom to join the discussion.

Friday Session 4

2:45 – 3:30 Collins 2-115

I'm Finally Beginning to Understand Why I Didn't Understand...; George Bodner, Purdue University, West Lafayette, IN

More than thirty years of research on the teaching and learning of chemistry has helped me understand why I, like so many others, struggled to understand the chemistry courses I took in spite of the fact that I was a motivated student, who was interested in becoming a chemist. This seminar will focus on what we have learned about problem solving in chemistry. It will start with the basic assumption of the constructivist theory of knowledge: Knowledge is built in the mind of the learner. The goal, by the end of the seminar, is to build a model of problem solving that has three characteristics. First, it has to be consistent with the results of our studies of what successful problem solvers do when they solve novel problems. Second, it must be teachable; it must be something that can be used by both undergraduates and graduate students to help them become more successful at problem salving. Third, it has to be transferrable; it has to be generic enough that it not only leads to success in one particular chemistry course but can be applied to other chemistry courses, as well as courses outside the department for which chemistry is a prerequisite.

OR

Collins 2-135

Online interactive modules for Chemistry courses at Durham Technical Community College; Caroline Sloan, Element Learning, Durham, NC

Online courses in the sciences are flourishing in the current education landscape. Most of these courses consist of videos, and slide-based presentations. These videos may widely vary in production value; from simply a recording of the classroom lecture to slickly produced videos by commercial studios. Textbook publishers are usually responsible for slide-based presentations and include figures, equations, and questions directly from the subject text.

Standard E-learning Industry software can enable interactive online learning modules, where students can immerse into topics that confuse them. Instructors can strategically control the flow of information, progression of the course materials, and capture useful information about the learning experience. Web-based Learning Management Systems (LMSs) are well-equipped to accept and exchange information with these modules.

I will show examples of what these online interactive modules can do for your online classrooms. And then I will present some tools for making these online interactive modules, and show some that I have made for Durham Technical Community College. This presentation will allow others to suggest ideas and questions in the next round of development for these modules.

Friday Session 5

3:45 – 4:30 Collins 2-115

Open Stax Content + Adaptive Learning Tools: A Formula for Success; Christopher Holder, Knewton Higher Education

Adaptive learning tools are well-suited for use in blended learning models. A truly adaptive platform offers continual analysis of student performance toward both defined and pre-requisite learning objectives; and meaningful instructional content alongside opportunities for practice. Such a resource empowers students to fill their own skill and knowledge gaps, which might stem from a variety of course areas and disciplines, and are unique to each learner. In this session, we'll talk about the use of one adaptive learning tool, Knewton, in the context of General Chemistry and three blended learning models.

OR

Collins 2-135

Do More with Less! Teach and Do Research; Melissa Armstrong, Gaston College, Dallas, NC

Do you long for your graduate school days when you were actively involved in doing research? Do you wish your students could have the same passion for your subject that you do? Do you find yourself looking out over your classroom and seeing mostly glazed over expressions? Are you bored and want to make a change? If so, come learn how to get started in embedding undergraduate research into your classroom. Participants are encouraged to bring a copy of their syllabus and a creative mind. Participants will actively work on a plan to begin the process of implementing undergraduate research in their classroom.

Friday Evening Banquet

5:30-7:30

Wynn Center Multi-Purpose Room (Wynn 10-103)

Banquet Speaker

6:15 – 7:00

A Nerd's Guide to Home Brewing; Jason Andrus & Dr. Walda Powell, Meredith College, Raleigh, NC

Saturday, November 4

8:00 am – 12:00 pm **Registration**
Collins 2-178

Collins 2-164
(Lobby) **Breakfast (Continental)**

8:00 – 2:30 **Exhibits**
Collins 2-164
(Lobby)

9:15 – 9:30 **Announcements & Raffle Giveaway**
Collins 2-178

Saturday Keynote

9:30 – 10:15 **High Structure Active Learning Approaches to Teaching Organic Chemistry**; Dr. Michael T. Crimmins, The University of North Carolina at Chapel Hill, Chapel Hill, NC
Collins 2-178

10:15 – 10:30 **Refreshments**
Collins 2-164
(Lobby)

The Refreshment area will also be available between sessions.

Saturday Session 1

10:30 – 11:15 **Teaching Ethics in Chemistry Courses**; Cristina Sacco, Wake Technical CC, Raleigh, NC
Collins 2-115
As science continues to advance and become more complex, we must be able to discuss ethical dilemmas. It is argued that teaching young scientists about ethical behavior and scientific conduct is critical for them to analyze data, develop ethical reasoning and decision-making skills for future controversies that may arise. This workshop will focus on why the discussion of ethics is vital for students enrolled in chemistry courses and strategies to introduce ethics into your first or second year chemistry courses.

OR

Collins 2-135 **How to answer the question: "Why do I have to take chemistry?"** William Urban, Indiana State University, Terre Haute, IN
When teaching GOB pre health chemistry students, do you find yourself asked this question by the students? Are you unsure if you have a medically relevant answer? Or are you a new faculty member who knows chemistry is important but do not have some relevant examples to incorporate into your material to prove to your students that chemistry is important to the successful student's health career? I will provide some updated real life examples you can incorporate into your lectures to prove to the pre-health student that chemistry is integral to medicine.

Saturday Session 2

11:30 – 12:15 **An alternative to OPENSTAX: A free General Chemistry Online Course;** Ketan Trivedi, Trivedi Chemistry, Blacksburg, VA

Collins 2-115

Based on the interactive software program, currently available from Trivedi Chemistry, A new , online ,bri free full year of General Chemistry is being made available. This online course is meant to be an alternative to Openstax. It will cover the full normal range of topics and concepts in a direct and well formatted structure. It is an approach, of clear and simple tutorials that are thoughtfully laid out and easy for the student to comprehend. It is designed and written by Dr. Ketan Trivedi who has taught over 10000 students. Over 11+ years of teaching, Dr. Trivedi has won several teaching awards. With his strong background in writing computer code, he has applied his understanding of how to teach students chemistry to produce this e-text.

OR

Collins 2-135 **The effects of the Science Writing Heuristic**; Jihyun Kim, Guttman CC CUNY, New York, NY

Teaching chemistry to non-science majors is very challenging issue. Most of students come to class unprepared and /or have a negative attitude to chemical sciences. Hence connecting what they learned in class to the lab activity is very crucial. It increases their success rate in chemistry. Unfortunately, traditional lab activities tend to focus on procedures rather than learning outcomes. Truly I do ask students "Did you follow the procedure?" And I took off points when students didn't follow a traditional lab report format. This old fashioned (past) lab activity doesn't integrate the learning of content with the scientific method. We need to develop an inquiry based lab activity, student-centered lab practice. Students are in charge of their learning and they are given an authority to design their lab activities as their learning experience is progressed. For example, students use the science writing heuristics instead of a traditional lab report. They question their topics; I guided them to come up with their own idea to outline methods instead of telling them to follow procedures; execute their design; claim their findings with supporting materials; reflect their instructional design based on their outcomes. Not surprisingly this is how learning works and we can focus on learning outcomes instead of procedures. Thus, student-centered learning environments will help students better appreciate chemical sciences in a positive way and increase conceptual learning.

12:30 – 1:30 **Lunch**

Wynn Center Multi-Purpose Room (Wynn 10-103)

Saturday Session 3

1:45 – 2:30 **Utilizing ACS resources to accomplish your professional goals** Mary Roslonowski, Eastern Florida State College, Melbourne, FL

Collins 2-115

We all have a professional goal we'd like to accomplish as a two-year college teacher. Resources at two year colleges are limited but ACS is here to help us. Whether you want to get a undergraduate research program started, develop a new technical program at your college, or create online chemistry courses, ACS can help you. Learn about the ACS resources that can make your goals a reality at your institution and make connections with colleagues who have experience in your area of interest.

OR

Collins 2-135 **Formation of North Carolina Community College Chemistry Consortium**; Rodney Powell, Central Carolina CC, Sanford, NC

While the American Chemical Society along with the Two-Year College Chemistry Consortium (2YC3) can provide valuable guidance and leadership at the national level, there are many issues that deserve attention at the state level. Many disciplines (math, biology, and computer science, English, nursing, sociology and psychology, computer science for example) have instructor associations in North Carolina. This association would allow us to have unified and loader voice when curriculum changes are made at the state level. This session will be an open forum to discuss the steps necessary to start such an organization. Please bring with your ideas, questions, and concerns about the direction

Closing Session

2:45 – 3:30 **Get Ready for Gen Z**; Tracy Cheatham, Wake Technical CC, Raleigh, NC

Collins 2-178 Finally getting a handle on how to reach Millennials? Time to move on- the next generation is already here. This session will look at some characteristics of the upcoming Gen Z and how they are shaping the marketplace. Who are Gen Z and how can we best serve them? Come see how you can use your knowledge of Gen Z learners to increase your engagement and retention.

Future…

219th Conference:
Delgado CC
New Orleans, LA
March 16-17, 2018

25th Biennial Conference on Chemical Education:
University of Notre Dame
Notre Dame, IN
July 29 – August 2, 2018
BCCE2018.org

220th Conference:
University of New Mexico-Valencia
Los Lunas, NM
Dates TBA

For the most current information on upcoming 2YC$_3$ conferences, visit 2yc3.org

If you are interested in having your institution host a future 2YC$_3$ conference, send an email to futuresites@2yc3.org