American Chemical Society

Student Skills and Academic Excellence: Preparing Students for Employment/Transfer

ACS Committee on Professional Training

Society Committee on Education
Task Force on Two-Year College Activities

Joint 66th Southwest/62nd Southeast ACS Regional Meetings
December 3, 2010

Symposium goals

- Review the value of employability skills
- Identify ways in which employability skills can be incorporated into the first two years of college education
- Identify ways in which ACS guidelines support student transitions
- Compile ACS guidelines and other resources that can support curriculum development in the first two years

Symposium Schedule

9:00 a.m. Introductory remarks

9:05 a.m. ***Laying a foundation for success: Student skills and the ACS Guidelines***

9:45 a.m. Addressing the challenges of teaching transferable skills

10:45 a.m. Break

11:00 a.m. Fostering excellence in the first two years: Leveraging ACS resources to address transferable skills

12:00 p.m. Concluding remarks

American Chemical Society

Laying a foundation for success: Student skills and the ACS Guidelines

T.Y. (Uni) Susskind
Oakland Community College (Emeritus)

Society Committee on Education
Task Force on Two-Year College Activities

Joint 66th Southwest/62nd Southeast ACS Regional Meetings
December 3, 2010

Session Goals

- Review background of ACS Guidelines
- Identify resources to address student skills
- Explore how student skills are addressed

History of ACS Two-Year College Chemistry Guidelines

- 1970 - *Guidelines for Chemistry Programs in Two-Year Colleges*
- 1985 - Critical Issues in Two-Year College Chemistry (SOCED recommendation)
- 1988 - *Guidelines for Chemistry and Chemical Technology Programs in Two-Year Colleges*
- 1991 - Establishment of the Chemical Technology Program Approval Service (sunsetted in 2009)
- 1997 - *Guidelines for Chemistry Programs in Two-Year Colleges*
- 2009 - *ACS Guidelines for Chemistry in Two-Year College Programs*

Purpose of the Guidelines

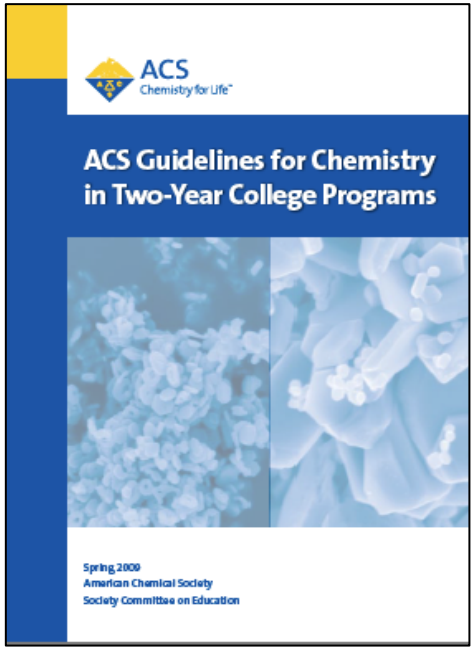
- Vision of excellence
- Comprehensive model designed to be used by a broad range of two-year college institutions
- Framework for self-studies and program reviews
- Resource for:
  - Faculty working conditions,
  - Space requirements
  - Curriculum and instrumentation
  - Topics to share with administrators, colleagues, union members, partnering institutions and organizations

Goals of the Guidelines revision

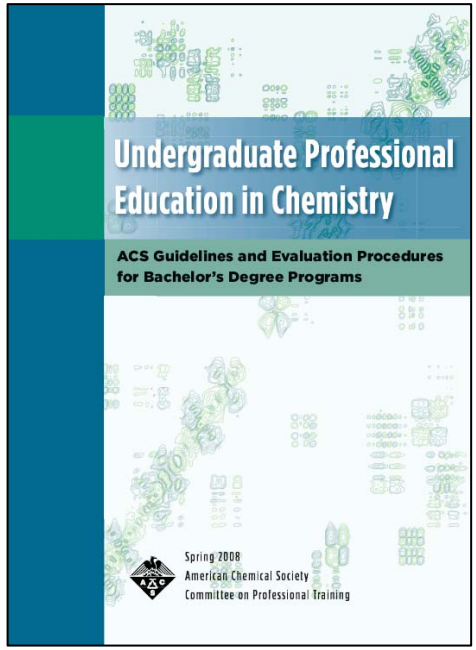
- Reflect changes in pedagogy, technology, accountability
- Provide a more useful resource for strengthening programs and offering guidance
- Facilitate student transfer by aligning with the 2008 *ACS Guidelines and Evaluation Procedures for Bachelor's Degree Programs*

Alignment of ACS guidelines

ACS Guidelines for Chemistry in Two-Year College Programs



ACS Guidelines and Evaluation Procedures for Bachelor's Degree Programs



ACS Guidelines and Transferable Skills

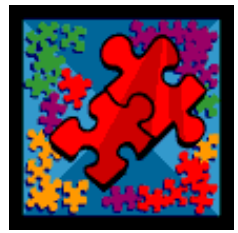
- Section 7: Development of Student Skills
  - Problem-solving skills
  - Chemical literature skills
  - Laboratory safety skills
  - Communication skills
  - Team skills
  - Ethics
- Four-year Guidelines: supplements on above (www.acs.org/cpt)
- Two-year Guidelines: supplements in development
  - Chemistry-based technology supplement (draft)
  - www.acs.org/2YGuidelines

What are student skills?

- Other terms used:
  - Process skills
  - Employability skills
  - Career success skills
  - Essential skills
  - Soft skills
  - Nontechnical professional competencies
- Characteristics:
  - Generic and transferable
  - Lifelong and marketable
  - Wide applications that go beyond course content

What do we mean by “Problem Solving Skills”?

- Tools to solve problems
  - Define/analyze problems clearly
  - Develop a testable hypothesis
  - Design/execute experiments
  - Sort through data
  - Draw appropriate conclusion(s)
  - Understand the fundamental uncertainties in experimental measurements



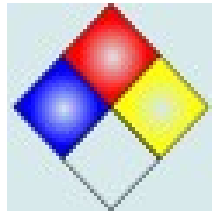
What do we mean by “Chemical Literature Skills”?

“Set of abilities requiring individuals to recognize when information is needed, and have the ability to locate, evaluate, and use effectively the needed information.”

American Library Association (ALA)

What do we mean by "Laboratory Safety Skills"?

- Understand the concepts and application of safe laboratory practices
  - Understand responsible disposal techniques
  - Understand and use Material Safety Data Sheets (MSDS)
  - Recognize/minimize potential chemical/physical hazards in the laboratory
  - Comply with Occupational Safety and Health Administration (OSHA) requirements



What do we mean by "Communication Skills"?

- "Effective communication is vital to a scientist."
- Industry, where 46% of new bachelor's graduates go,* has identified "outages," especially
  - Communication skills
  - Team skills

Chemical & Engineering News, June 2, 2008, p. 52

What do we mean by “Team Skills”?

- Be able to
  - Work effectively in a group to solve problems
  - Be leaders as well as followers
  - Interact productively with a diverse group of peers

What do we mean by “Ethics”?

- Be able to
  - Display high personal standards and integrity
  - Demonstrate an awareness of contemporary issues related to chemistry
  - Recognize ethical applications of chemistry in industrial, governmental, and/or societal settings
- The most ethical course of action is often the most difficult.

What other student skills should we address?

Addressing student skills

- Student research/internships
- Incorporation into existing courses
- Dedicated courses
- Use various instructional techniques
- Use student research
- Other?

Teaching student skills

- What advantages/challenges exist to teaching student skills
  - At the two-year college
  - At the four-year college
  - In the workplace

Conclusions

- Student skills are lifelong skills that are valuable at all levels of academic and professional careers.
- ACS Guidelines and supplements address and stress the importance of student skills.
- The most recent revision of the *ACS Guidelines for Chemistry in Two-Year College Programs* emphasizes student skills in preparation for upper-level courses and the workplace.

Symposium Schedule

9:00 a.m. Introductory remarks

9:05 a.m. Laying a foundation for success: Student skills and the ACS Guidelines

9:45 a.m. ***Addressing the challenges of teaching transferable skills***

10:45 a.m. Break

11:00 a.m. Fostering excellence in the first two years: Leveraging ACS resources to address transferable skills

12:00 p.m. Concluding remarks

American Chemical Society

Addressing the challenges of teaching transferable skills

Ann Sullivan, J. Sargent Reynolds Community College
Ron Darbeau, McNeese State University
Curt Theriault, The Dow Chemical Company
Amina El-Ashmawy, Collin College, Facilitator

Society Committee on Education
Task Force on Two-Year College Activities

Joint 66th Southwest/62nd Southeast ACS Regional Meetings
December 3, 2010

Panelists

- Ann Sullivan, J. Sargent Reynolds Community College
- Ron Darbeau, McNeese State University
- Curt Theriault, The Dow Chemical Company

Student skills in Guidelines

- Problem solving
- Chemical literature retrieval
- Laboratory safety
- Communication (Oral and written)
- Team work
- Ethics

Symposium Schedule

9:00 a.m. Introductory remarks

9:05 a.m. Laying a foundation for success: Student skills and the ACS Guidelines

9:45 a.m. Addressing the challenges of teaching transferable skills

10:45 a.m. ***Break***

11:00 a.m. Fostering excellence in the first two years: Leveraging ACS resources to address transferable skills

12:00 p.m. Concluding remarks

Symposium Schedule

9:00 a.m. Introductory remarks

9:05 a.m. Laying a foundation for success: Student skills and the ACS Guidelines

9:45 a.m. Addressing the challenges of teaching transferable skills

10:45 a.m. Break

11:00 a.m. ***Fostering excellence in the first two years: Leveraging ACS resources to address transferable skills***

12:00 p.m. Concluding remarks

American Chemical Society

Fostering excellence in the first two years: Leveraging ACS resources to address transferable skills

Nancy Mills, Trinity University
Kristine Smetana, John Tyler Community College

Society Committee on Education
Task Force on Two-Year College Activities

Joint 66th Southwest/62nd Southeast ACS Regional Meetings
December 3, 2010

Goals and Outcomes

- Goals
  - Address challenges of integrating non-technical, transferable skills into the curriculum
  - Share resources from ACS/other organizations that can help
  - Develop strategies for overcoming barriers using ACS/other resources
- Outcomes
  - Useful tools necessary to plan and to execute actions that can foster excellence in two-year college chemistry programs
  - Network of two-year chemistry colleagues
  - Commitment to implement these activities

Transferable Skills

- Also known as “soft skills,” “higher order skills,” “student skills,” “non-technical skills,” “employability skills,” “process skills”…
- Necessary for success in education and workplace
- Examples include
  - Teamwork
  - Communication skills
  - Safety
  - Facility with the chemical literature
  - Ethics
  - Problem solving skills

A question…

What are the most effective strategies for incorporating transferable skills into an already packed curriculum?

Developing Strategies: Safety Scenario Enactment

I have been asked to make sure that my students are knowledgeable about chemical safety but I am not sure that I am up to date on current regulations. Where do I find out about these things?

Developing Strategies: Analyzing the Interactions

1. Who are the key players? Who should be involved that has not been mentioned?

2. What ACS/other resources can be applied to this scenario?

3. What strategies might be pursued? What could be done differently to ensure a more positive outcome?

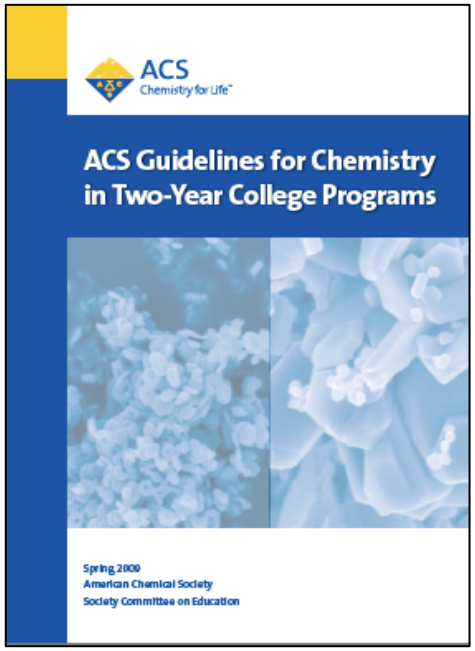
4. What are the next steps?

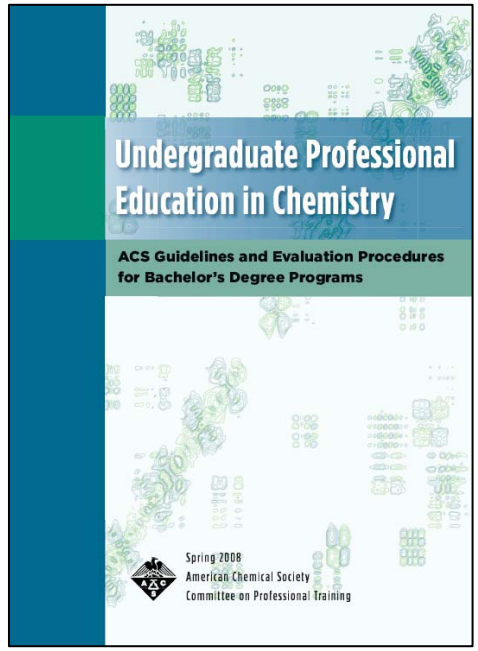
Applying Connections

- Who has connected with other faculty or departments?
- Who has worked with
  - Administrative personnel?
  - Teaching/learning centers?
  - Support service personnel?
  - Admissions?
  - Unions?
  - Consortia or other partnerships?
  - ACS?

ACS Guidelines

- *ACS Guidelines for Chemistry in Two-Year College Programs*
- *ACS Guidelines and Evaluation Procedures for Bachelor's Degree Programs*





Guidelines Supplements

- ACS *Guidelines and Evaluation Procedures for Bachelor's Degree Programs*
  - Chemical Information Retrieval
  - Teaching Professional Ethics
  - Preparing a Research Report
  - Safety and Safety Education
  - Development of Student Skills in a Chemistry Curriculum
- *ACS Guidelines for Chemistry in Two-Year College Programs*
  - Chemistry-based technology (draft)

Topics to consider

- Topic A: How can transferable skills be integrated into the curriculum?
- Topic B: How can employers and educators collaborate to improve the transferable skills of the workforce?
- Topic C: How can transferable skills be assessed?

or

Focus on specific skills

- Teamwork
- Communication skills
- Safety
- Chemical literature
- Ethics
- Problem-solving skills

Topics to Consider

- Overarching topics
  - How can transferable skills be integrated into the curriculum?
  - How can employers and educators collaborate to improve the transferable skills of the workforce?
  - How can transferable skills be assessed?
- Scenarios regarding specific skills
  - Teamwork
  - Communication skills
  - Safety
  - Chemical literature
  - Ethics
  - Problem-solving skills

Developing Strategies: Breakout Session

1. Assemble into small groups and introduce yourselves
2. Select a Time-Keeper and a Reporter for your group

   Time-Keeper: Keep group on-task and on-time

   Reporter: Record key points from group discussions
3. Discuss the selected topic, considering:

   Strategies needed to address the topic

   Resources that can help
4. Report two key items from your discussion
5. Turn in the sheet at the end of the session

Developing Strategies: Group Reports

1. What scenario are you discussing?
2. Who needs to be involved in the conversation?
3. What resources could support your efforts?
4. What are the strategies to be pursued?
5. What are the next steps?

Report out: Topic A

- How can transferable skills be integrated into the curriculum?

Report out: Topic B

- How can employers and educators collaborate to improve the transferable skills of the workforce?

Report out: Topic C

- How can transferable skills be assessed?

Report out: Teamwork skills

- How can teamwork skills be incorporated in the curriculum?

Report out: Communication skills

- How can communication skills be incorporated into the curriculum?

Report out: Chemical information

- How can skill in accessing chemical information be incorporated into the curriculum?

Report out: Ethics

- How can an understanding of ethics be incorporated into the curriculum?

Report out: Safety

- How can knowledge about chemical safety be incorporated into the curriculum?

Report out: Problem-solving skills

- How can problem-solving skills be incorporated into the curriculum?

Sharing Other Available Resources

- American Association of Community Colleges (AACC): Funding and Grants
- National Science Foundation
  - NSF Advanced Technological Education Program (ATE)
  - NSF Math and Science Partnerships (MSP)
  - NSF STEM Expansion Program (STEP)
  - NSF S-STEM Program
- League for Innovation in the Community College
- ChemEd Bridges
- National Institute for Occupational Safety and Health (NIOSH) College and University Health and Safety Award
- Neighborhood partnerships
- Workplace partners

Goals and Outcomes

- Goals
  - Address challenges of integrating non-technical, transferable skills into the curriculum
  - Share resources from ACS/other organizations that can help
  - Develop strategies for overcoming barriers using ACS/other resources
- Outcomes
  - Useful tools necessary to plan and to execute actions that can foster excellence in two-year college chemistry programs
  - Network of two-year chemistry colleagues
  - Commitment to implement these activities

Conclusions

- Transferable skills are life-long skills.
  - Support academic success
  - Support career success
- Challenges to teaching transferable skills can be addressed strategically.
- A variety of resources are available to support teaching transferable skills.

More questions?

- Contact the ACS Office of Two-Year Colleges
  - **Mail**: American Chemical Society
    1155 16th St, NW
    Washington, DC 20036
  - **Phone**: 1-800-227-5558, ext. 6018
  - **Email**: 2YColleges@acs.org
  - **Web**: www.acs.org/2YColleges

Society Committee on Education (SOCED) Task Force on Two-Year College Activities

John V. Clevenger, Truckee Meadows Community College, Emeritus (Chair), NV
Dolores C. Aquino, San Jacinto College, TX
Nathan Beach, Paradigm Environmental Services, Rochester, NY
Mary T. Berry, University of South Dakota
Scott J. Donnelly, Arizona Western College, AZ
Amina El-Ashmawy, Collin College, TX
Thomas B. Higgins, Harold Washington College, IL
Kirk Hunter, Texas State Technical College, TX
George Kriz, Western Washington University, WA
Nancy S. Mills, Trinity University, TX
Ieva L. Reich, University of Wisconsin, Madison, WI
Armando Rivera-Figueroa, East Los Angeles College, CA
Jorge Salinas, Miami Dade College, FL
Douglas J. Sawyer, Scottsdale Community College, AZ
Susan M. Shih, College of DuPage, Emeritus, IL
Kristine Smetana, John Tyler Community College, VA
Tamar Y. (Uni) Susskind, Oakland Community College, Emeritus, MI

Consultants to the Society Committee on Education (SOCED) Task Force on Two-Year College Activities

Neil Bastian, Salt Lake Community College, UT
Ken Capps, Central Florida Community College, FL
Thomas Jose, Blinn College – Bryan Campus, TX
Pamela Clevenger, Hinds Community College, MS
Brahmadeo Dewprashad, Borough of Manhattan Community College, NY
Candice McCloskey-Campbell, Georgia Perimeter College – Dunwoody, GA

Acknowledgements

- Society Committee on Education
- Two-Year College Chemistry Consortium
- Division of Chemical Education Committee on Chemistry in the Two Year Colleges
- Office of Two-Year Colleges

Thank you for your participation!

Questions? Comments?

- Contact the ACS Office of Two-Year Colleges
  - **Mail**: American Chemical Society
    1155 16th St, NW
    Washington, DC 20036
  - **Phone**: 1-800-227-5558, ext. 6018
  - **Email**: 2YColleges@acs.org
  - **Web**: www.acs.org/2YColleges