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Issues in Science and Technology Librarianship

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Science and Technology Resources on the Internet

Selected Internet Resources on Chemistry Education

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Introduction

Chemistry Education serves the dual purpose of preparing those conducting research in academia or chemical-based industry production, as well as those teaching chemistry as general education. The boundaries between chemistry and other subjects such as biology, physics and environmental science, are blurring. Contemporary chemistry education has expanded beyond a general understanding of the nature of chemistry to include problem solving, scientific inquiry and other technical skills required in the modern scientific community. Topics in research and teaching, including team-based learning, chemical data visualization, instruction technologies and laboratory learning, merge developments in both natural science and educational practices.

Scope and Methods

This guide is focused on web resources serving instructors at the secondary level and above, chemistry education researchers, academic librarians, practicing chemists and chemical technologists. The purpose of this webliography is to collect some of the best resources on chemistry teaching and learning and educational research.

Online resources, including web sites, databases, e-books, bibliographies, etc., were reviewed and evaluated to compile this webliography. The criteria for selection included relevancy, target audience, authority, accuracy, and currency. This webliography is not exhaustive, but includes the most relevant resources in chemistry education and related fields. All resources except subscription-based journals are free and publicly accessible.

[Major Web Sites](#) list comprehensive teaching and learning resources for all levels of education. [Organizations](#) consist of professional and other organizations that are either independent or nested in chemistry or education associations. [Publications](#) include both scientific magazines and academic journals. Academic journals publish articles on theoretical perspectives, laboratory practices, literature reviews, and experimental papers, including systematic evaluations of innovative practice. [Conferences and Meetings](#) include major national and international conferences for chemistry and chemistry education, where instructors and scholars gather annually or biannually to share experiences and communicate innovative ideas. [Academic Programs and Research Centers](#) list units supported by colleges and universities that serve education and research at the college level and above. [Resources for Teaching Chemistry](#) provide classroom teaching and laboratory resources for hands-on activities that include guidelines, safety issues, demonstrations and tutorials.

Major Web Sites

Education, American Chemical Society (ACS)

<http://www.acs.org/content/acs/en/education.html>

ACS Education provides comprehensive teaching and learning resources from elementary school to graduate school. It covers chemistry education in the broadest sense, including lab tutorials, online examinations, workshops and seminars, textbooks, news, reports, e-books, and scholarly publications.

ChemCollective

<http://chemcollective.org/home>

ChemCollective is a collection of engaging, online activities created by Carnegie Mellon University faculty who are interested in chemistry education. It provides virtual labs, scenario-based learning activities, tutorials and concept tests.

ChemistryGuide

<http://www.chemistryguide.org/>

This site provides a directory and search engine of chemistry resources. There are approximately 250 resources in the directory, and it can be browsed by topics such as green chemistry and chemistry dictionaries.

LearnChemistry

<http://www.rsc.org/learn-chemistry/collections/Higher-Education/>

LearnChemistry Higher Education is published by the Royal Society of Chemistry and provides practical guides for students and instructors on how to read a scientific article, how to cite sources in the Royal Society of Chemistry format and how to perform pedagogical research in the STEM disciplines.

Chemical Education Digital Library (ChemEd DL)

<http://www.chemeddl.org/>

Sponsored by the National Science Foundation, ChemEd DL provides access to numerous digital, educational resources, such as an interactive Periodic Table, organic stereochemistry tutorials, a virtual laboratory, biographies of chemists and more.

The Green Chemistry Education Network (GCEdNet)

<http://cmetim.ning.com/>

Sponsored by the University of Oregon and the National Science Foundation, GCEdNet is a network of educators from colleges, universities, community colleges and high schools who exchange ideas on incorporating green chemistry into the curriculum. This site also includes links to green chemistry news resources published by the American Chemical Society, Yale University, the University of Massachusetts Lowell and other organizations.

Organizations

Division of Chemical Education (DivCHED), American Chemical Society

<http://www.divched.org/>

DivCHED is one of the 33 divisions within the American Chemical Society, with membership from the entire education spectrum. DivCHED provides information about ACS meetings, the ACS Examinations Institute, the Biennial Conference on Chemistry Education, and its publications, the *Journal of Chemical Education* and the *CHED Newsletter*.

Two-Year College Chemistry Consortium (2YC3)

<http://www.2yc3.org/>

2YC3 provides a forum for chemistry educators to enhance chemistry teaching and student learning in two-year colleges. 2YC3 is governed by Regional Advisory Boards and is responsible for organizing four 2YC3 conferences per year and publishing newsletters.

Chemistry Teacher, Science Buddies

<http://www.sciencebuddies.org/science-engineering-careers/earth-physical->

[sciences/chemistry-teacher](#)

Science Buddies is a non-profit organization that provides resources for K-12 students, teachers and parents seeking science fair project ideas in all areas of sciences. The resources include personalized learning tools, an online platform of science professionals who volunteer to help students and answer questions, teaching resources, and hands-on project guides for parents and teachers.

Publications

The journals listed below publish papers related to chemistry education. Some concentrate on chemistry at specific educational levels while others cover all educational levels. The majority of journals are subscription based, but some open access journals are also included. Most of these journals carry a mixture of articles that range from classroom teaching techniques to laboratory practices guidelines, chemistry education research and literature reviews.

Australian Journal of Education in Chemistry (AusJEC)

<http://www.raci.org.au/divisions/further-information-2>

Formerly titled, the *Australian Journal of Chemical Education*, this journal is published by the Royal Australian Chemical Institute. It covers teaching and learning of chemistry at all levels.

Biochemistry and Molecular Biology Education

<http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291539-3429>

This bi-monthly publication by Wiley disseminates educational materials in biochemistry, molecular biology and related fields such as biophysics and cell biology. This journal covers topics of pedagogical approaches, research in biochemistry and molecular biology education, teaching and learning techniques and literature reviews.

Chemistry Education Research and Practice (CERP)

<http://pubs.rsc.org/en/journals/journalissues/rp#!recentarticles&all>

An open access journal published by the Royal Society of Chemistry, CERP is a peer-reviewed journal that publishes research reports, theoretical perspectives on chemistry education, and reviews of research and other areas that are significant to the teaching and learning of chemistry.

Eurasian Journal of Physics and Chemistry Education (EJPCE)

<http://www.eurasianjournals.com/index.php/ejpce>

EJPCE is an open access journal published bi-annually in April and October. The journal publishes original and review articles with broad coverage of physics and chemistry education.

Journal of Chemical Education (JCE)

<http://pubs.acs.org/journal/jceda8>

JCE is published by the Division of Chemical Education of the American Chemical Society, co-published with the American Chemical Society Publications Division. The journal serves chemistry teachers from middle school through graduate school and professional staff that support teaching and scientists in industry or government.

The Chemical Educator

<http://chemeducator.org/>

A peer-reviewed journal published by Springer-Verlag from 1996-2002, *The Chemical Educator* has been published online independently since 2003. It covers current topics, teaching methodology and experimental practices for chemical teaching at all levels.

Chemical Heritage Magazine

<http://www.chemheritage.org/discover/media/magazine/index.aspx>

Chemical Heritage is a scientific magazine published three times a year by the Chemical Heritage Foundation. This magazine publishes stories of chemistry from a humanities perspective intended for scientists, teachers, historians and the public with interest in science and the history of science.

Education in Chemistry (EiC)

<http://www.rsc.org/eic/e-magazine>

EiC is an educational magazine published by the Royal Society of Chemistry. EiC covers news, articles and letters for audiences ranging from K-12 schools to universities.

Conferences and Meetings

ACS National Meeting & Exposition

<http://www.acs.org/content/acs/en/meetings/spring-2014.html>

ACS National Meetings take place twice a year in various cities in the U.S., and each meeting draws approximately 11,000 to 13,000 chemists, chemical engineers, academicians, graduate and undergraduate students and other related professionals. The Division of Chemical Education hosts symposia and programs at national and regional meetings.

Biennial Conference on Chemistry Education (BCCE)

<http://www.bcce2014.org/aboutus.html>

BCCE is a national meeting sponsored by the Division of Chemical Education of the American Chemical Society. The conference is designed for those who teach chemistry from secondary school to graduate school.

Gordon Research Conference on Chemistry Education Research & Practice

<http://www.grc.org/programs.aspx?id=13620>

The Gordon Research Conference is a bi-annual conference that provides an international forum for the exchange of ideas on biological, chemical and physical science.

Academic Programs and Research Centers

CER Graduate Program, Miami University in Ohio

<http://chemistry.miamioh.edu/bretzsl/cermiami.html>

CER is a graduate program led by two professors, Dr. [Stacey Bretz](#) and Dr. [Ellen Yeziarski](#). Dr. Bretz conducts research on assessment, misconceptions and learning theory in undergraduate laboratories. Dr. Yeziarski conducts research on inquiry, as well as teacher and high school chemistry education.

The Center for Peer-Led Team Learning (PLTL)

<https://sites.google.com/site/quickpltl/>

Peer-Led Team Learning (PLTL) is an active-learning instructional method which originated in a chemistry course at the City College of New York. The Center for Peer-Led Team Learning holds national meetings and provides information on relevant publications and other PLTL programs at universities across the United States.

Cole Research Group, University of Iowa

<http://chem.uiowa.edu/cole-research-group>

Dr. Renee Cole conducts research on how students are learning chemistry and how that guides the design of instructional materials and teaching strategies. Current projects include "Using Discourse Analysis to Explore Student Understanding of Chemistry," "Increasing the Impact of TUES Projects through Effective Propagation Strategies" and the "Analytical Chemistry POGIL Project."

CREATE for STEM Institute, Michigan State University

<http://create4stem.msu.edu/>

Sponsored by Michigan State University, CREATE (Collaborative Research in Education, Assessment, and Teaching Environments) for STEM is a research institute for the fields of science, technology, engineering and mathematics (STEM). This institute brings together STEM faculty and faculty from the College of Education for collaborative research projects on the teaching and learning of science.

Institution for Chemical Education (ICE), University of Wisconsin - Madison

<http://ice.chem.wisc.edu/>

Sponsored by the University of Wisconsin, Madison, ICE is a national center for research that provides workshops and publications on chemical education. ICE also provides education and outreach materials for the University of Wisconsin, Madison Nanoscale Science and Engineering Center (NSEC).

Science Education Group, Boston University

<http://polymer.bu.edu/edu/>

This group carries out education projects for the Center for Polymer Studies (CPS), a science visualization center at Boston University. Featured projects include Network Science in Education, Virtual Molecular Dynamics Laboratory Workshops for High School Teachers and more.

Resources for Chemistry Teaching

Classroom Teaching

ACS Examinations Institute

<http://chemexams.chem.iastate.edu/>

The ACS Examinations Institute produces standardized exams in various subdisciplines of chemistry. It offers instructors and students electronic delivery of exams, exam statistics and information about laboratory assessment and research projects.

Process Oriented Guided Inquiry Learning (POGIL) Curriculum Materials

<https://pogil.org/resources/curriculum-materials/classroom-activities>

POGIL is a research-based, student-centered teaching methodology, which originated in chemistry classes in colleges in the 1990s. POGIL replaced lectures with guided inquiry through self-managed collaborative learning among students along a three-phase learning cycle: the "Exploration" phase, the "Concept Invention" or "Term Introduction" phase, and the "Application" phase ([Moog & Spencer 2008](#)). This teaching methodology enhances content mastery, problem-solving skills and lifelong learning. This site provides curriculum materials and resources for instructors to implement the POGIL teaching approach as facilitators at the high school level and above. The POGIL Project is sponsored by the National Science Foundation, the Department of Education and other foundations.

Chalkbored

<http://www.chalkbored.com/index.htm>

Chalkbored is a web-based book created by Jeremy Schneider for sharing practical education issues. Chalkbored Chemistry 11 and Chemistry 12 provide worksheets, handouts, labs and slides for high school chemistry teaching. All materials are free to download for classroom teaching or

personal use.

Resources for Chemistry Education

<http://www.chem1.com/chemed/>

This site provides annotated web links to instructional materials for chemistry teachers in settings ranging from K-12 schools to the undergraduate level. Resources include open access textbooks, reviews, reference information, homework, quizzes and policy information.

Laboratory Activities

The Interactive Lab Primer

<http://www.chem-ilp.net/index.htm>

This site was developed by the Royal Society of Chemistry Teacher Fellowship Scheme. It addresses topics and skills including working safely, lab techniques, lab apparatus and reference materials to support students' transition from the high school to the university laboratory.

The Laboratory Safety Institute (LSI)

<http://labsafetyinstitute.org/Resources.html>

LSI is an international non-profit education organization for laboratory safety that serves universities, industries, governments and libraries. The resources page provides lab safety guidelines, safety videos and accident reporting.

Virtual Chemistry

<http://www.chem.ox.ac.uk/vrchemistry/>

Sponsored by Oxford University, Virtual Chemistry applies a three-dimensional simulated laboratory to chemistry instruction. The Virtual Experiments section of the web site provides interactive tutorials and quizzes. The site also features links to 3-D demonstrations, an interactive periodic table and 3-D reaction mechanisms.

References

Eberlein, T., Kampmeier, J., Minderhout V., Moog, R.S., Platt, T., Varma-Nelson, P., & White, H.B. 2008. Pedagogies of engagement in science. *Biochemistry and Molecular Biology Education* 36(4): 262-73. doi:[10.1002/bmb.20204](https://doi.org/10.1002/bmb.20204).

Moog, R.S. and Spencer, J.N. 2008. POGIL: An overview. *ACS Symposium Series* 994: 1-13.

Taber, K.S. 2012. Recognising quality in reports of chemistry education research and practice. *Chemistry Education Research and Practice* 13(1): 4-7.
[doi:10.1039/C1RP90058G](https://doi.org/10.1039/C1RP90058G).

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