Chemical Information Literacy: Is It Affordable?

Affordable tools for teaching undergraduates at small institutions and community colleges

–Patricia E. Kirkwood
–Pacific Lutheran University
–Tacoma, WA 98466
An Ideal Instruction Program

- Introduces students to chemical information products gradually throughout the four year program.
- Has information products integrated into every laboratory.
- Includes critical analysis of information in every course.
Time

- Program development
- Keeping skill sets alive
- Class time
- Tutoring time
- Keeping current
Money

- Salaries at levels that attract qualified individuals
- Class time
- Product costs
- Travel funds for training
From CHMINF-L Archive

- xxxxxx pointing out on Dec. 3 that yyy has been trying unsuccessfully to recruit a chemistry librarian for over a year, then zzzz and xxxx adding they also are having trouble recruiting science librarians for their institutions, has triggered a lively discussion about the job market for chemistry and science librarians, and what qualifications are necessary for these positions.

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Mon, 9 Dec 2002 15:57:04 -0500
CHEMICAL INFORMATION SOURCES DISCUSSION LIST
<CHMINF-L@LISTSERV.INDIANA.EDU>
Salary Survey

♦ Average base salary (CINF)
  – Bachelor Degree Institution
    • $44,900 (9 respondents, average age 46)
  – Doctorial Institutions
    • $50,500 (91 respondents, average age 46)

Affordable tools

♦ Cost effective
♦ Used by multiple departments
♦ Duel purpose products
♦ Easily accessible (via web)
♦ Willing to provide IP AND password access
♦ Minimal set up time
♦ Price options such as per search pricing for the smallest schools
Cost effectiveness

♦ Cost per use: Every product is measured by the amount of use. Whenever possible use information is gathered and used to determine if the product is cost effective.

♦ Cost per student: This figure should be based on the primary user group of any given product.
Cost effectiveness
ACS electronic only journals

♦ On campus access via IP address provides number of articles accessed during a given period. In 2002 our use (on campus only) was 2305 articles.

♦ We are required to have a certain number of ACS titles for accreditation, so these funds would be spent regardless of instruction programs. (duel use)

♦ We are able to provide electronic access at NO additional cost through the “Reverse Plan B”.

♦ Off campus access allowed through password.
Cost effectiveness
ACS electronic only journals

♦ As a consortium we have access to more at the same price.

♦ “Consortial arrangements potentially reduce web subscription costs and can possibly increase the number of journals that can be accessed. Consortial agreements vary…” Alan Diehlmann a_diehlmann@acs.org

♦ Must purchase the electronic archive if going electronic only.
Ease of Use

- An interface that non-science librarians can easily use
  - OCLC First Search
  - EBSCOHost
- Must be able to teach basic use in under ½ hour
What is in my shopping basket?
What products can I afford?

♦ Reference
♦ Primary
♦ Secondary
Reference Resources

♦ AccessScience (McGraw Hill)
  – through BCR
  – discount based on program

♦ Handbook of Chemistry and Physics (CRC)
  – direct from publisher
  – discount based on undergraduate status

♦ knovel
  – Free resources

♦ Kirk-Othmer and other encyclopedias (Wiley)
  – direct from publisher
  – discount based on program
Electronic Archives

- Bundled pricing can give access to more materials
- No shelf space or binding costs
- Access to rudimentary (or better) search products
- Creates a sufficient body of electronic resources to attract use
- ILL can fill in on the current resources

**HOWEVER**

- Seems like purchasing the same product twice especially if you are purchasing the electronic version for current access
- You must find a way to make the journals easily accessible to your community. (More than 5 titles means a web page doesn’t cut it.) Our solution – [Journals at PLU](#).
You searched: journal chemical education
Results: (1 to 3) of 3 records.

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<th>ISSN</th>
<th>Range</th>
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<td>0021-9584</td>
<td>v.48-v.60; v.64-v.70, no.2; v.77, no.4, 1971-1983; 1987-1993; 2000- (MICROFILM: v.1-v.69 1924-1992.)</td>
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<td>Journal of Chemical Education</td>
<td>0021-9584</td>
<td>v.73 no.9- Sept 1996- to present</td>
<td>Access requires password</td>
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Electronic Archives

♦ American Physical Society [http://publish.aps.org/]
  – All APS titles after 5 years
  ~$400 for smaller schools
  – Access to the SPIN database

♦ JStor [http://www.jstor.org/]
  – A multidisciplinary tool
  – American Mathematical Society archives are a part of *Arts and Sciences Collection I*
  – Philosophical Transactions (of the The Royal Society) starting in 1665 can be used for historical purposes on topics like the acceptance of Darwin’s theories (part of *General Science Collection*)
Electronic Archives

♦ Free archives such as HighWire
  http://highwire.stanford.edu/

♦ ACS
  – Must have if moving to electronic only subscription
  – Access to all of the ACS titles after current period
Electronic Archives

♦ Individual titles
  – Scientific American Archives
    http://www.sciamarchive.org/browse.cfm
    • Available through BCR at a nice discount
  – Journal of Chemical Education
    http://jchemed.chem.wisc.edu/Subscribers/Login/
    • Stand alone subscription with password access – IP access costs more
  – Journal of Chemical Physics
    http://ojps.aip.org/jcpo/
    • Nominal cost to add back archive

♦ Takes time to manage and subscribe
Electronic Reviews

  – Electronic access for individual titles approximately $10-$45 in addition to print for current 5 years
  – Site license available
  – Most titles are in EBSCOHost *Academic Search Premier* with a 1 year embargo

  – Elsevier
  – Pricing set by number of research faculty including postdocs.
Indexing and Abstracting

- OCLC FirstSearch
  - BasicBiosis, per search option
  - General Science Abstracts, multidisciplinary, includes all ACS journals
  - Medline also available

- EBSCOhost
  - Academic Search Premier
    - Over 3000 journals full text.
    - Deep back file for some titles
    - Many good science titles

- Consortium pricing
Chemical Abstracts

- No good pricing / interface option available for small schools that allows searching by the general chemistry undergraduate population.
- Academic discounts allows searching through STNEasy and STNWeb for SOME chemistry students and faculty after 5pm.
- Training time during the day available.
Chemical Abstracts options

- **CAStudent Edition**
  - Subset of CA focused towards undergraduate curriculum
  - OCLC FirstSearch
  - Academic discounts
  - Still out of reach for small schools
    - Compare to *General Science Abstracts* and *BasicBiosis*
  - Need a per search pricing option (like BasicBiosis)
  - Not considered a viable product by CAS
Chemical Abstracts options

♦ STNEasy
  - Good interface for easy searches
    • Author
    • General subject
  - Doesn’t need a chemistry expert to use
  - Academic discount makes searching affordable

BUT
  - Compound searching awkward and expensive
  - After 5 pm only
  - Per answer pricing means the cost is unpredictable
Chemical Abstracts options

♦ STNWeb
  – Academic discount makes it affordable for selected population
  – No special hardware or software needed
BUT
  – Command driven
  – Takes time to learn and teach
  – Minimum of 4 hours instruction time
NOT AFFORDABLE

♦ SciFinder Scholar
  – Unless there is an announcement at this meeting – the least expensive price is 3 schools sharing 2 seats at $6.5K per school

♦ Web of Science

♦ Crossfire
  – Some affordable pricing options are being explored
What if small schools don’t?

♦ In 1996-97 there were a total of 7104 ACS approved graduates.

♦ Approximately 1/2 of these graduates come from schools not offering a Ph.D.

♦ More 1/2 of the ACS approved schools graduate less than 25 chemists (certified and uncertified) and were not affiliated with a larger school (i.e. SUNY schools)

According to the CPT 1997 Annual Report Table*
What if we aren’t really?

- Expenditures for all forms of chemical information vary drastically depending on highest degree granted. Institutions at which the doctoral degree is the highest offered in chemistry spend almost 1 order of magnitude more on chemical information than do institutions conferring only bachelor’s degrees. Institutions at which the master’s degree is the highest degree offered in chemistry are especially struggling to afford chemical information.

- Despite significant improvements in electronic gateways to chemical information and databases, the use of chemical information in undergraduate chemistry curricula appears to be diminishing.

Report on the Results of the CPT Library Survey in Fall 2000* (Winter 2002)
http://www.chemistry.org/portal/resources?id=3da02f22432911d6fb3c4fd8fe800100
What if librarians don’t?

- Costly resources are not used
- Library becomes a study hall and librarians are relegated to clerical positions
- Faculty are not aware of newer resources
- Students spend more time looking for information and less time learning the subject matter and incorporating information
Association of College and Research Libraries
Information Literacy Competency Standards for Higher Education

Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning. An information literate individual is able to:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one’s knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally
Fluency with information technology requires three kinds of knowledge: contemporary skills, foundational concepts, and intellectual capabilities. These three kinds of knowledge prepare a person in different ways for FITness.

- Contemporary skills, the ability to use today's computer applications, enable people to apply information technology immediately. In the present labor market, skills are an essential component of job readiness. Most importantly, skills provide a store of practical experience on which to build new competence.

- Foundational concepts, the basic principles and ideas of computers, networks, and information, underpin the technology. Concepts explain the how and why of information technology, and they give insight into its opportunities and limitations. Concepts are the raw material for understanding new information technology as it evolves.

- Intellectual capabilities, the ability to apply information technology in complex and sustained situations, encapsulate higher-level thinking in the context of information technology. Capabilities empower people to manipulate the medium to their advantage and to handle unintended and unexpected problems when they arise. The intellectual capabilities foster more abstract thinking about information and its manipulation.
ACS CPT guidelines

A student graduating with an ACS-certified degree in chemistry should have a demonstrable understanding of the general content and organization of:

– Chemical Abstracts
– Other principal secondary sources, e.g., Beilstein, Current Contents, Index Chemicus, Science Citation Index, etc.
– Standard reference works, e.g., Handbook of Chemistry and Physics, Gmelin, Mellor, Landolt-Börnstein, etc.
– Primary literature sources
– Computerized chemical databases, e.g., Chemical Abstracts Service CA file and Registry file
ACS CPT guidelines

Students should be able to:

♦ Efficiently locate chemical and physical properties of substances, including their spectra.
♦ Efficiently locate references for the synthesis or reactions of desired compounds or classes of compounds.
♦ Efficiently locate references to a desired type of chemical transformation.
♦ Identify the CAS Registry Number® of compounds.
♦ Complete a comprehensive subject search.
♦ Utilize CA subject indexes and Index Guide.
♦ Compile a complete bibliography of an author's publications.
♦ Locate recent review articles on a subject.
♦ Utilize a variety of methods to stay up-to-date on a subject.
♦ Know the importance of patents and be able to search for patents on a subject.
♦ Know about the availability and contents of relevant computerized databases (bibliographic and non bibliographic) and understand the basic techniques of on-line searching. (It is not anticipated that proficiency at on-line searching will be achieved, but the ability to interact productively with an information specialist is expected.)
Proficiency in chemical information retrieval should be acquired through formal instruction. In particular, Chemical Abstracts has become sufficiently complex that its use can no longer be easily self-taught. Instruction can be achieved in the following ways:

- Through a course dedicated to the subject of chemical information retrieval. A dedicated course of this kind can be greatly enhanced through library assignments from other courses.
- Through integration into other chemistry courses, such as:
  - laboratory courses, from sophomore through senior year, as assignments require library work
  - upper division courses
  - seminars
  - independent study
  - research
  - combination with a course in technical writing
- Through coordination and monitoring of each student's satisfactory achievement, preferably by one faculty member or librarian.
For more information

Contact me at

– Kirkwope@plu.edu
– 253-535-7443
– Mortvedt Library
– Pacific Lutheran University
– Tacoma, WA