



ChemPRIME Wiki-text and ChemPaths Online Student Portal from ChemEd DL

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Outline

- ▶ Definition of Needs
- ▶ Outline of Current Approaches
- ▶ Our Approach
 - ▶ What is ChemPRIME?
 - ▶ What is ChemPaths?
 - ▶ What is the role of the ChemEd DL?
- ▶ Questions to Guide Design & Feedback
- ▶ Other Avenues of Discussion & Future Directions
- ▶ Conclusion





Definition of Needs

- ▶ Instructors cover material in their courses according to various pedagogical approaches.
- ▶ Students learn well from relevant case-studies and real-world examples.
- ▶ Not all students are interested in the same example cases.
- ▶ Meta-cognition requires interactivity.





Present Approach

- ▶ Instructors cover material in their courses according to various pedagogical approaches.
 - ▶ Textbook, or institutional syllabus
- ▶ Students learn well from relevant case-studies and real-world examples.
 - ▶ Textbook inserts, home-made tutorials, in-class demos
- ▶ Not all students are interested in the same example cases.
 - ▶ Over the course of a semester cover a few different areas
- ▶ Meta-cognition requires interactivity.
 - ▶ Engaging online material, in-class participation, interactive homework

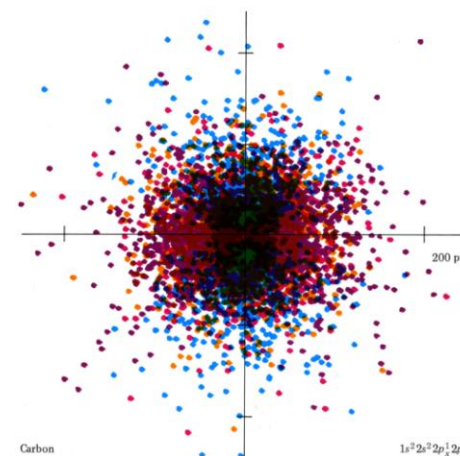
▶ Specific solutions to various needs



ChemPRIME

- ▶ Chemical Principles through Multiple Exemplars
- ▶ A digital copy of *Chemistry* by Moore, Davies and Collins
 - ▶ CoreChem
 - ▶ Provides a cohesive structure
 - ▶ Standard formalism
 - ▶ $[\text{HCl}]$; $\{\text{HCl}\}$; C_{HCl}
- ▶ “The Chemistry behind your favorite subject”
 - ▶ Biology
 - ▶ Sports
 - ▶ Physics
 - ▶ “Tracks”

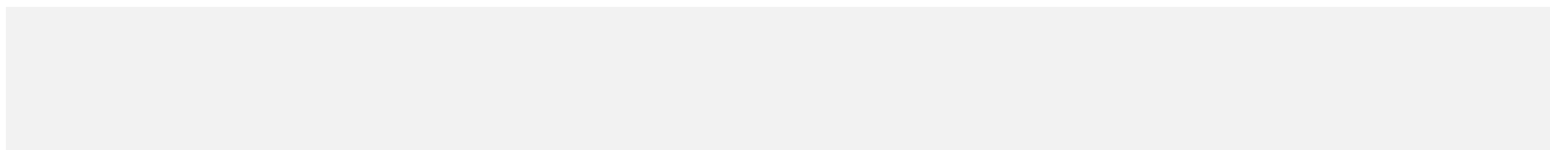
CHEMISTRY
John W. Moore | William G. Davies | Ronald W. Collins





Planning a Course?

- ▶ **Which book to use?**
 - ▶ Does it cover what you want?
 - ▶ Are modern examples available?
 - ▶ Does “Real World” look like your High School Years?



Let's take a look...

<http://wiki.chemprime.chemeddl.org>





How was it built?

- ▶ Scanners
 - ▶ OCR – Optical Character Recognition
 - ▶ Word Processing
 - ▶ Exporting to Wiki
 - ▶ Upgrade text/images
 - ▶ Adding Jmol for Molecules
 - ▶ Incorporating videos
 - ▶ Building navigable interface
 - ▶ Writing Exemplars...
- Diagram illustrating the contributors to the project:
- Jule Ober & Others (Contributed to OCR, Word Processing, Exporting to Wiki)
 - Adam Hahn
Tim Wendorff (Contributed to Upgrade text/images, Adding Jmol for Molecules)
-

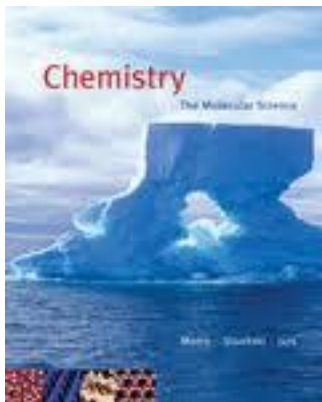




An Online Textbook

▶ Hardcopy Textbook

- ▶ Table of Contents
- ▶ Content/Layout of Sections
- ▶ Problems & Assessment
- ▶ Multimedia Supplements



▶ Online “Textbook”

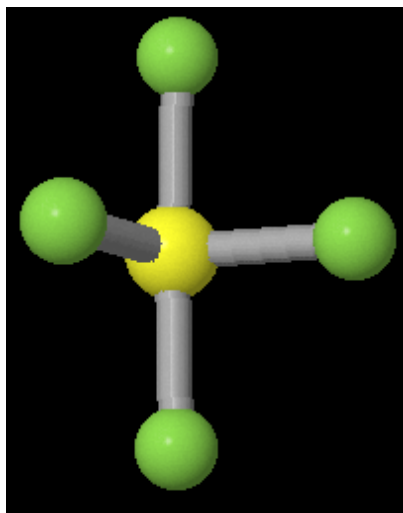
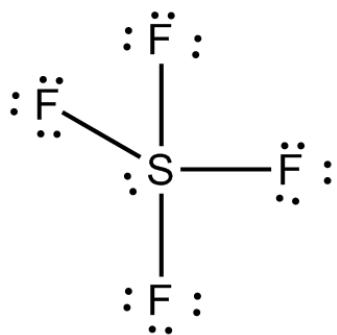
- ▶ Architecture of Site
- ▶ Page Layout/Content
- ▶ Problems & Assessment
- ▶ Multimedia/Interactivity



Schema in Space

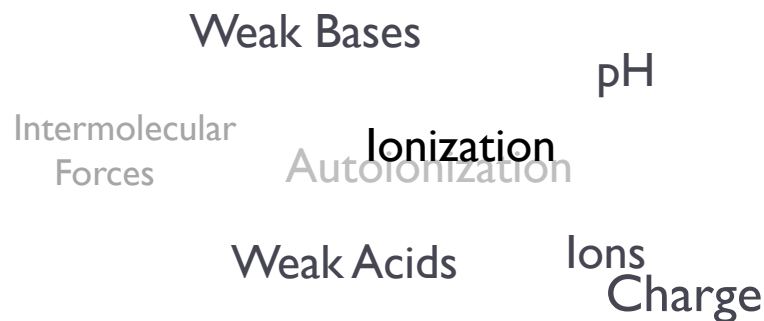
▶ Visuospatial Space

- ▶ Design principles
- ▶ 2D/3D
- ▶ Interlinked connections



▶ Semantic Space

- ▶ HyperText (http)
- ▶ Constructionist/Schema theory
- ▶ Words and Concepts are 'mapped'





Questions to Guide Design

- ▶ Broader definition from Wu & Shah, incorporating language from the realm of hypertext (Yang):
 - ▶ Provide multiple representations and descriptions of concepts.
 - ▶ Make linked referential connections visible among descriptions as well as among concepts.
 - ▶ Present the dynamic and interactive nature of chemical phenomena as well as the interlinked nature of chemical knowledge itself.
 - ▶ Promote the transformation between 2-D and 3-D.
 - ▶ Reduce cognitive load by making information explicit and integrated; likewise, make navigation focused.
- ▶ Apply these to the four aspects of a textbook...



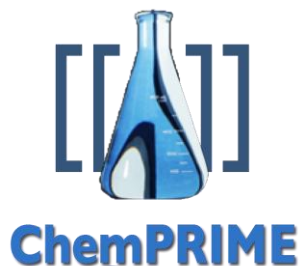
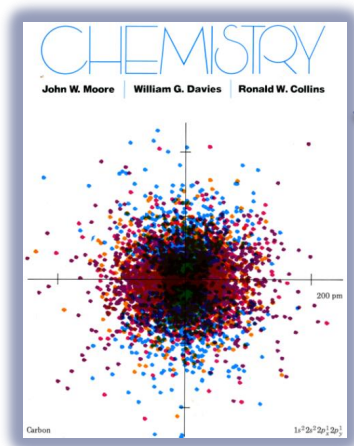
Questions to Guide Design

- ▶ Present the dynamic and interactive nature of chemical phenomena as well as the interlinked nature of chemical knowledge itself.

Architecture Layout Assessment **Interactivity**

Can students & instructors
manipulate, control, or edit
multiple representations?

The Role of The ChemEd DL...



Periodic Table Live!
Streaming Video
Jmol with *ab initio* data

JCE DLib: DUE-022624

Images: MDR-9154132

ChemEd DL: DUE-0632303

ChemPRIME: DUE-0837607



NSDL
THE NATIONAL SCIENCE DIGITAL LIBRARY





Chemical Education Digital Library

- ▶ Not a textual reference library
- ▶ Data Library
 - ▶ Standard Values
 - ▶ Homework? Sample Problems?
Graphing? Lab?
 - ▶ Question Repository
 - ▶ Houses *JCE* Qbank & other questions
 - ▶ Structures
 - ▶ Over 1000 molecules (chosen for their pedagogical use)
 - ▶ *ab initio* calculations (optimized geometry, frequencies, IR, MOs)
 - ▶ Videos, Animations, Tutorials
- ▶ Links Other Online Resources





How was it built?

- ▶ Instructors choose their own path through the various CoreChem and Exemplar pages
 - ▶ A php-wrapper embeds the text from a wiki, along with semantic links to related material
 - ▶ Within ChemPaths
 - ▶ Other Exemplar Tracks
 - ▶ Other NSDL Resources (limited use currently)
 - ▶ ChemEd DL resources *fully* integrated:
 - ▶ Periodic Table Live!
 - ▶ Models 360 data
 - ▶ Glossary
 - ▶ Other Tutorial Pages
 - ▶ Images
 - ▶ QBank
-





Let's take a look...

Sample Question in Moodle CMS





Student Comments

What was helpful?

"Being able to access required reading and homework almost anywhere. You can't forget your online textbook." –P68

"The availability and amount of resources increased greatly." –P24

What did you find that wasn't adequately replaced?

"Mobility." –P105

"The ability to have it right there in front of you. You just can't beat a traditional textbook." –P188

"portability, readability, bookmarks and highlighting" –P36

▶ All of these students are from the lecture which used ChemPaths



Would you recommend it?

To what extent would you recommend ChemPaths be used in future __ courses?

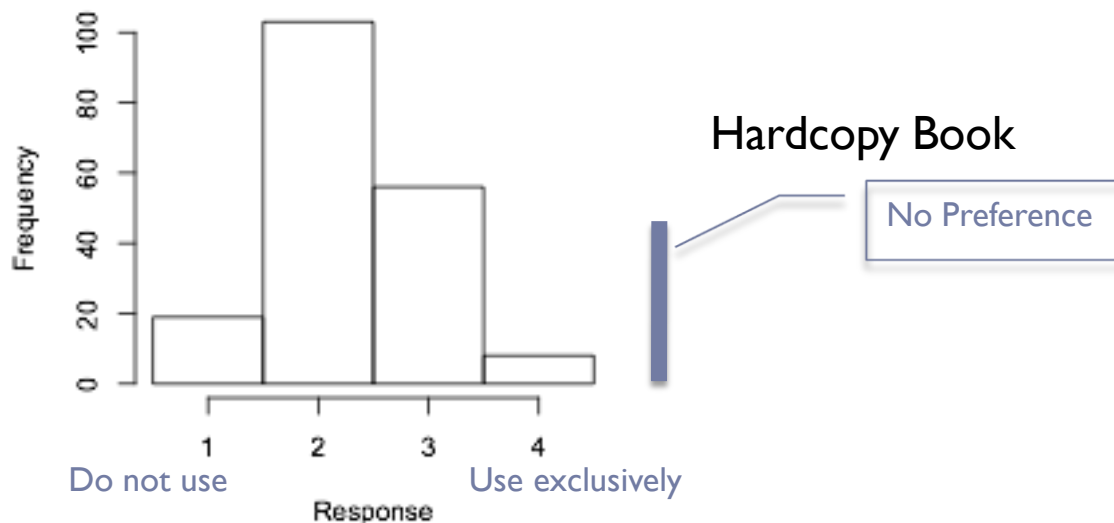
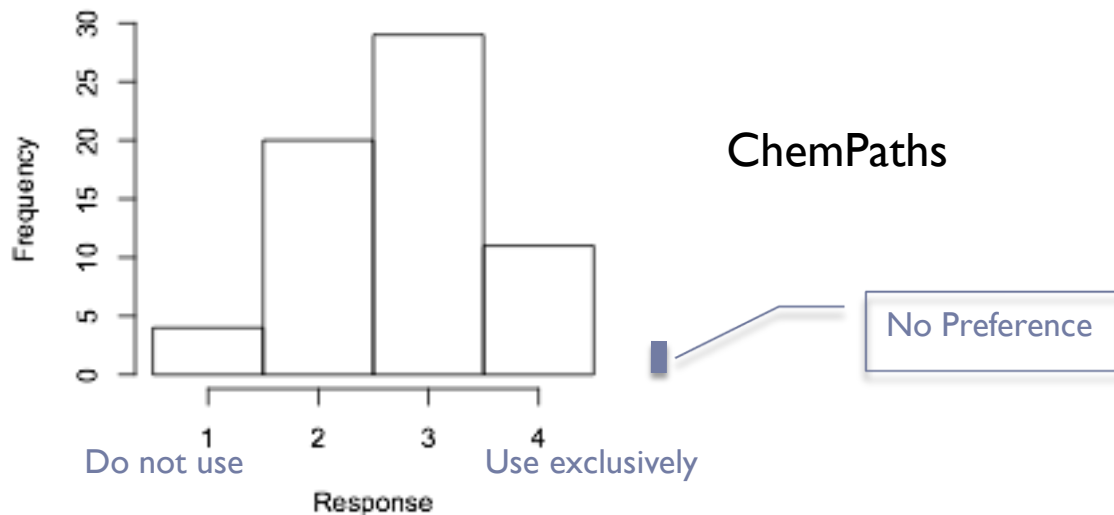
1 - It should not be used at all.

2 - It should be made available, but should not contain any information required for the course.

3 - It should be used to offer required information in addition to the traditional textbook.

4 - It should be used instead of requiring a traditional textbook.

5 - No preference.





Other Directions

- ▶ Diigo: Social Bookmarking, Highlighting & Annotating
- ▶ Quantitative Testing (Standardized Test Scores)
- ▶ The “no-textbook” group (around 25% of students)
- ▶ Pathway Analysis (how many students stick to the path?)

<http://www.chemeddl.org>





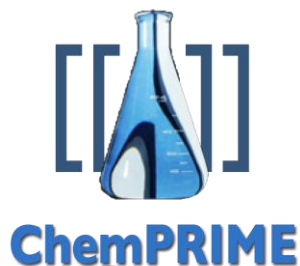
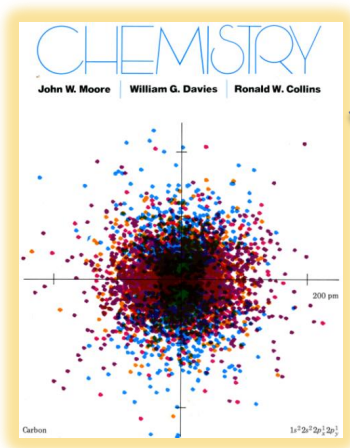
KUTZTOWN UNIVERSITY of Pennsylvania



CHEMISTRY

UNIVERSITY OF WISCONSIN - MADISON

Thank you for your attention!



ChemPaths

Learning to Meander



<http://chemed.chem.wisc.edu/chempaths>

<http://www.chemeddl.org>

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