

How to Customize, Re-mix, and Distribute Text-books of the Future with-in the LibreTexts Platform

Delmar Larsen

Executive Director, LibreTexts
Professor, Department of Chemistry,
University of California, Davis



<http://Libretexts.org>



<https://www.youtube.com/LibreTexts>



Those wishing to access and test drive LibreTexts during the presentation (and before or after) should register for an instructor's account at <https://tinyurl.com/Register4Libre>

Presentation Overview

The Big Picture – OER and LibreTexts Role in the current State of Affair for the OER Community

The Small Picture – Using LibreTexts to Remix Effectively

Support and Acknowledgement



Humanities library:

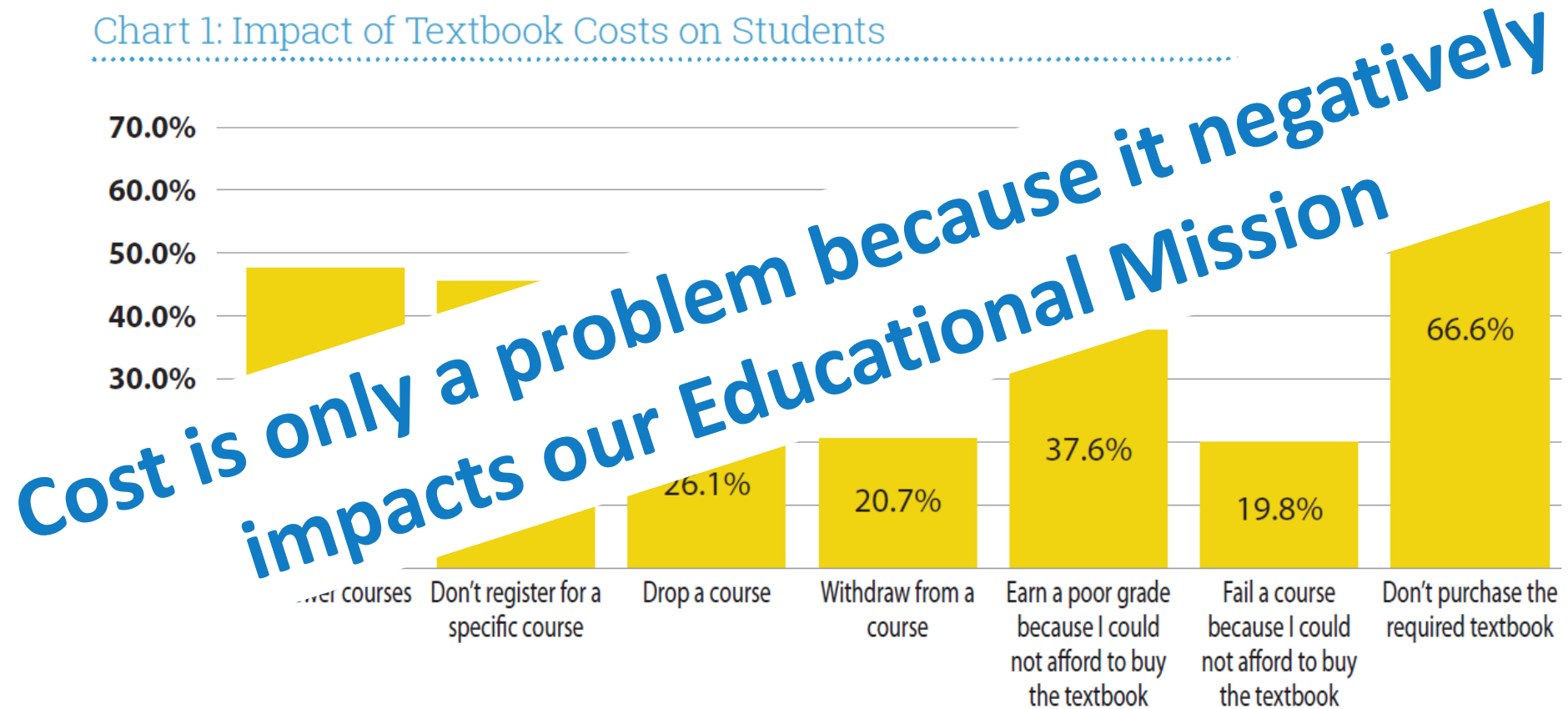
username: SpanishRocks

Password: LibreTexts!

Textbook Costs

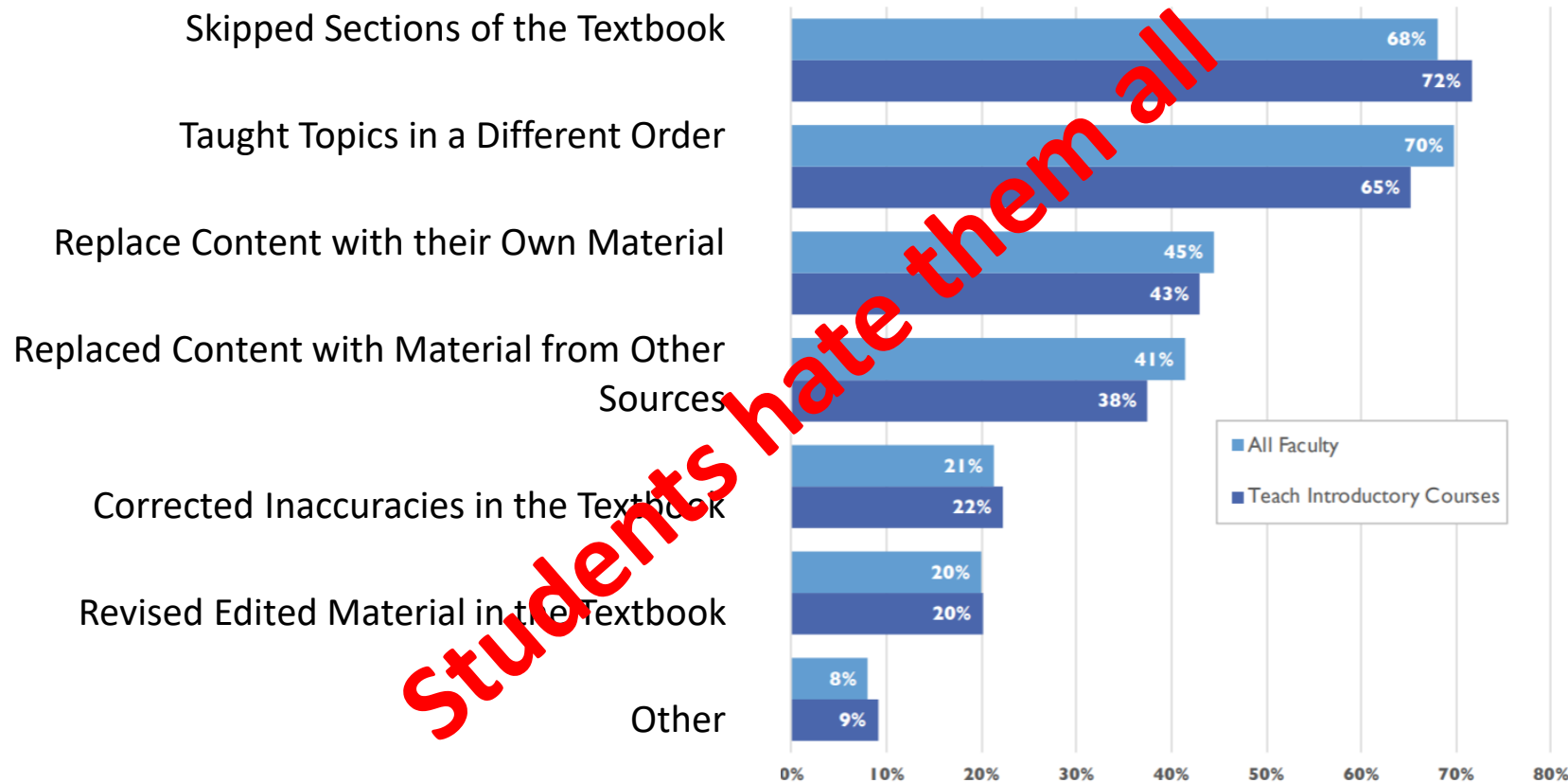
Price Changes (January 1998 to June 2019)
Selected US Consumer Goods and Services, Wages

Chart 1: Impact of Textbook Costs on Students



Source: <https://www.aei.org/publication/chart-of-the-day-or-century-2/> and Florida Virtual Campus. (2016). 2016 Florida Student Textbook & Course Materials Survey. Tallahassee, FL. Image curtesy of Michigan Tech (CCBY-SA 4.0)

Textbooks are not Tubesocks – We need Customizability



Freeing the Textbook: Educational Resources in U.S. Higher Education- Babson Survey Research Group 2018
<https://www.onlinelearningsurvey.com/reports/freeingthetextbook2018.pdf>

What is OER?

Open educational resources (OER) are free and **openly licensed** educational materials that can be used for teaching, learning, research, and other purposes.

- [The William and Flora Hewlett Foundation](#)

Open Educational Resources (OER) are teaching, learning or research materials that are in the public domain or released with intellectual property licenses that facilitate the **free use**, adaptation and distribution of resources.

- [UNESCO 2018](#)

Open Textbooks are a Solution?

- OER is the free (or should be)
- OER provides the ability for anyone to remix, reuse, and revise the material to better fit their course objectives.
- For example, do the materials you currently use provide examples that are inclusive of race, sex, age, and ability? Are they representative of the students taking your course?



The Constitution of OER - The Five 5Rs



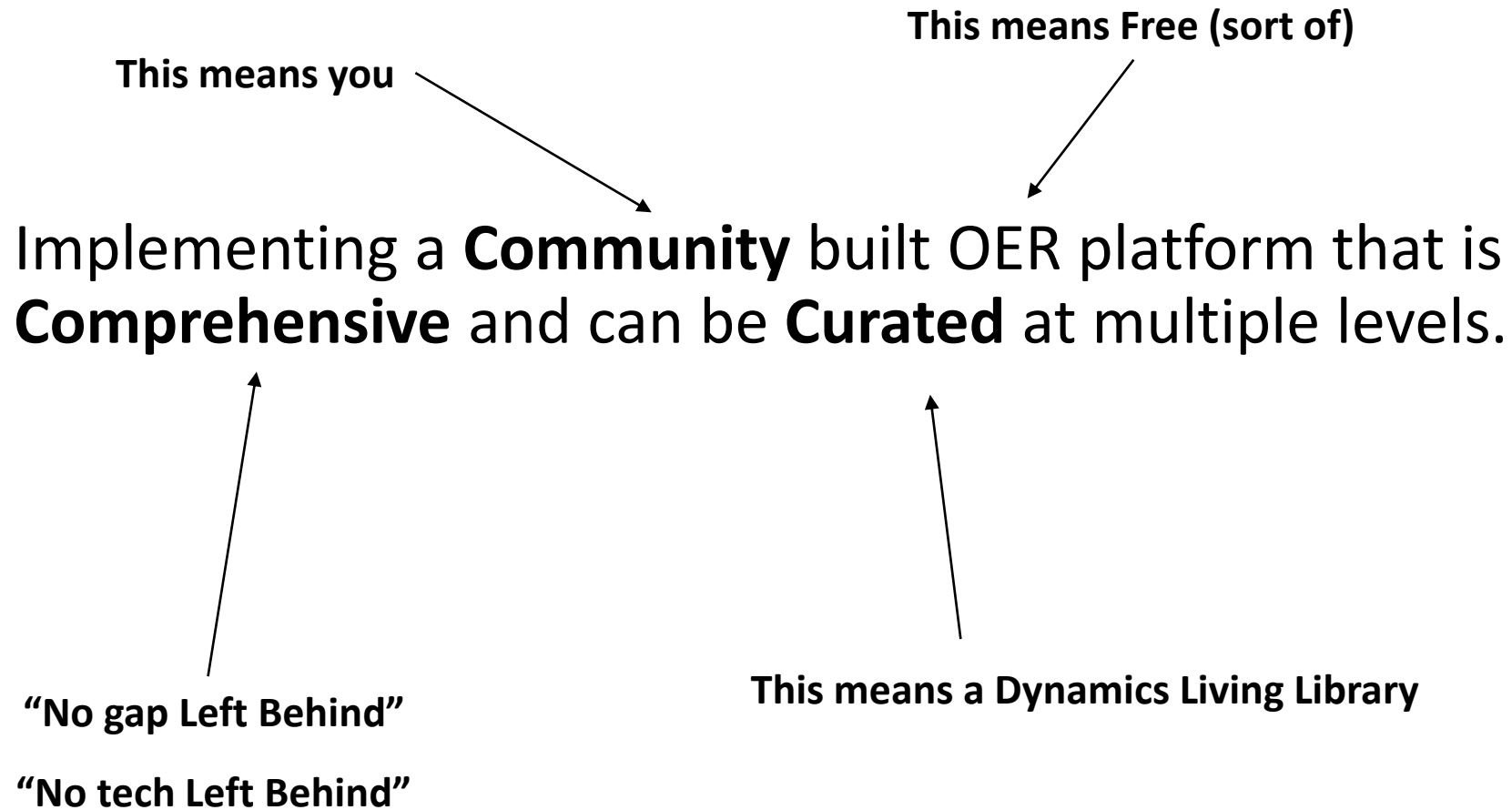
The LibreTexts is committed to maximizing the impact of the 5R for the community, by building a centralized **repository, authoring, and distribution** infrastructure designed for unparalleled remixing capability that is freely available to all.

You are convinced that now is the time to adopt OER. Where do you begin?

The OER Universe is Fragmented

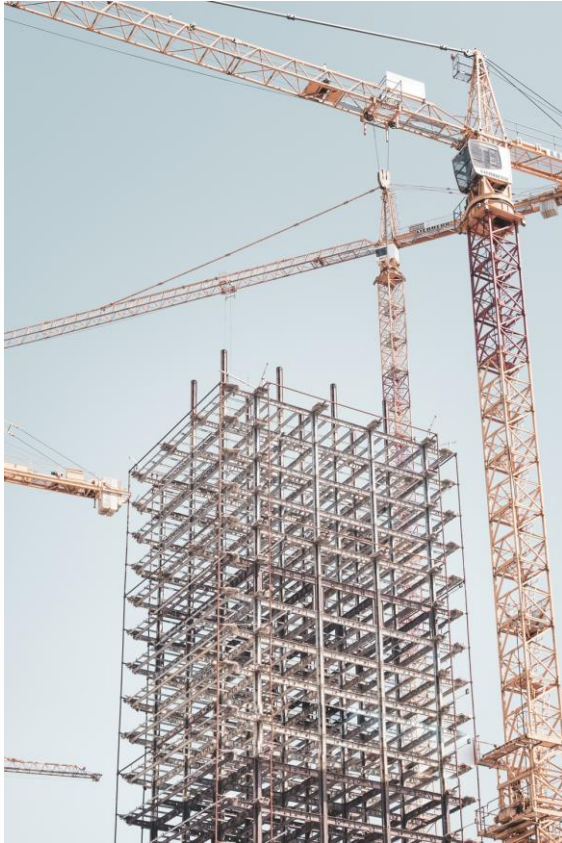


The LibreTexts Mission

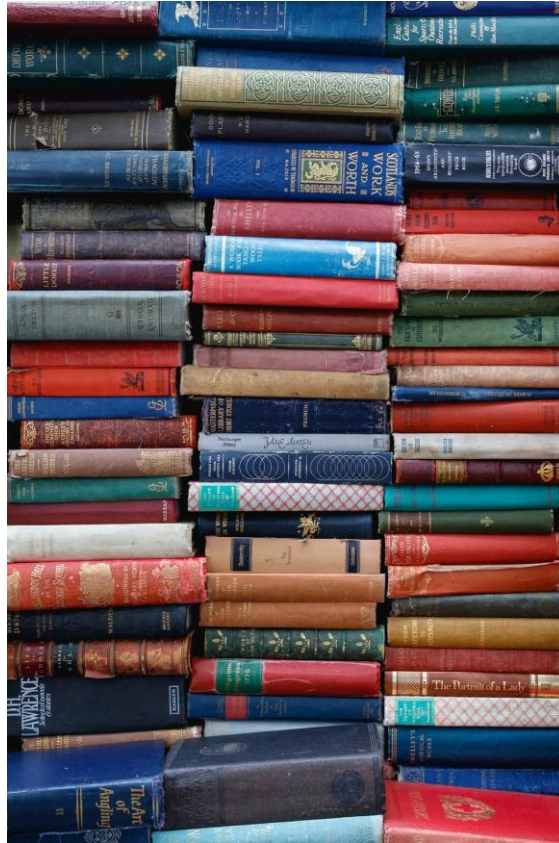


What is the LibreTexts

LibreTexts as a
Construction Platform



LibreTexts as
Dissemination Platform



LibreTexts as a
Learning Platform



Why don't faculty use OER?

- Not enough OER resources for my subject (49%),
- Too hard to find what I need (48%)
- There is no comprehensive catalog of OER resources (45%)
- Need an online homework systems and other support



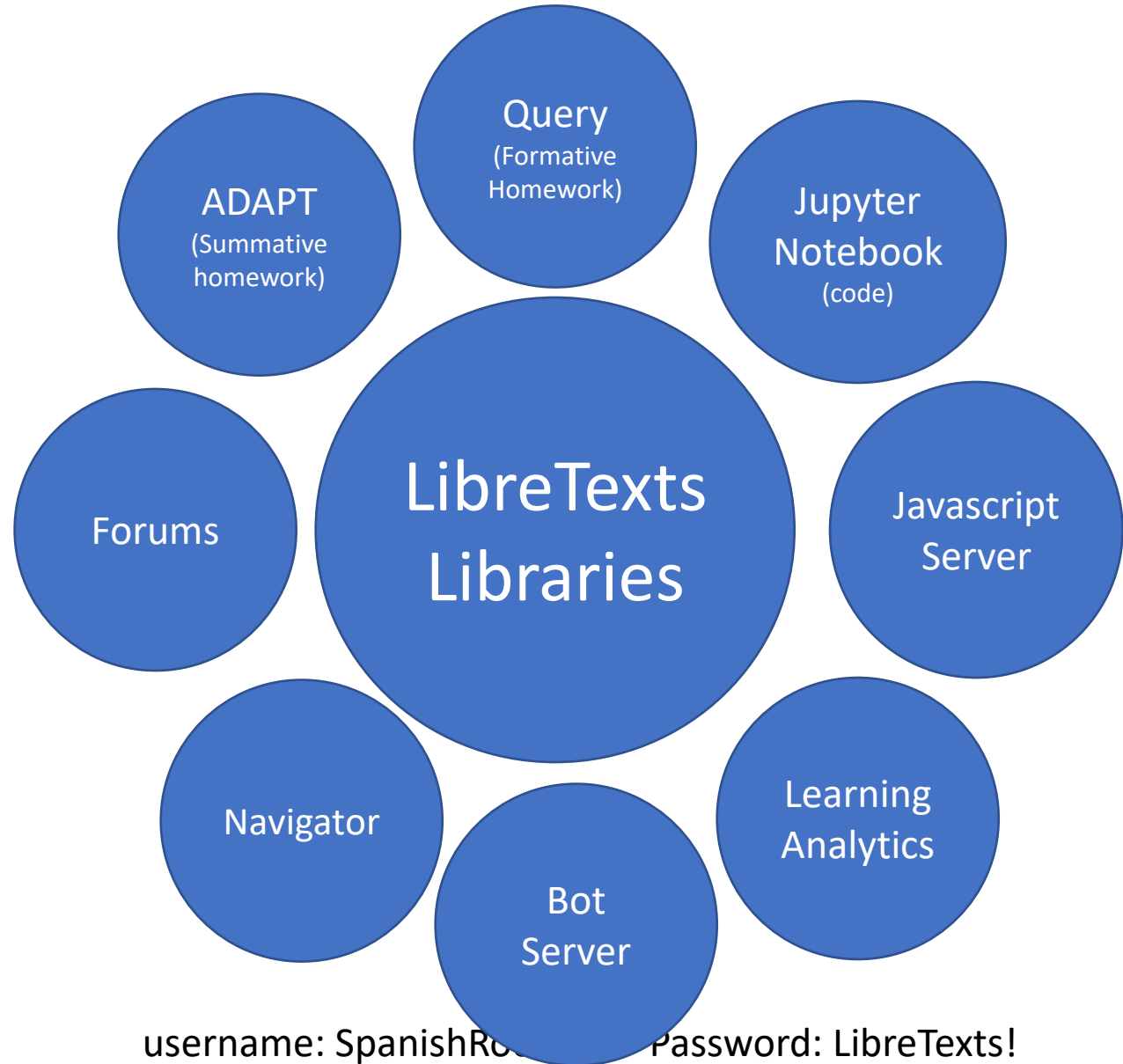
Has been designed by faculty to answer these needs

Opening the Textbook: Educational Resources in U.S. Higher Education- Babson Survey Research Group 2016

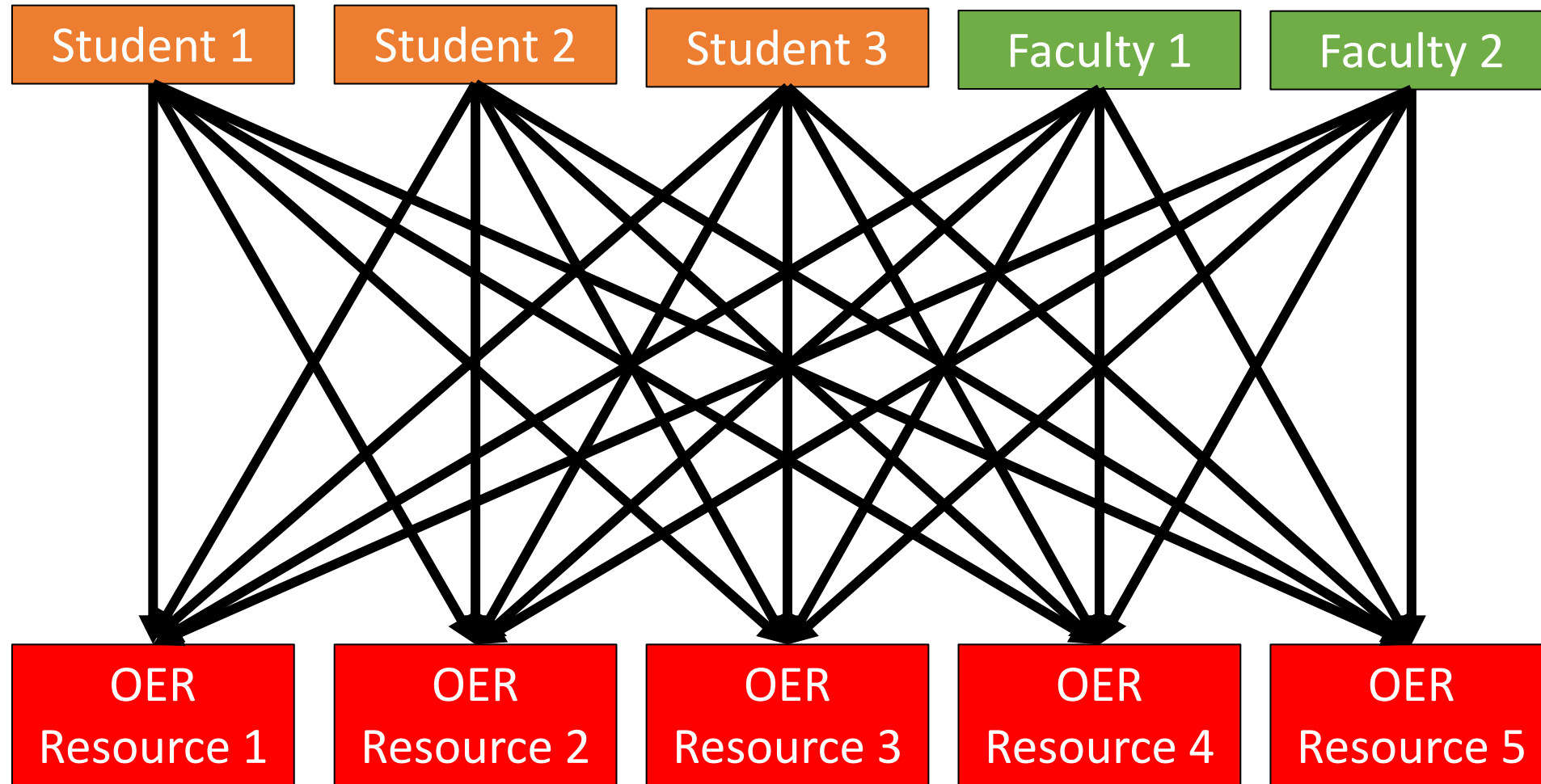
<https://www.onlinelearningsurvey.com/reports/freeingthetextbook2016.pdf>

Into the LibreVerse

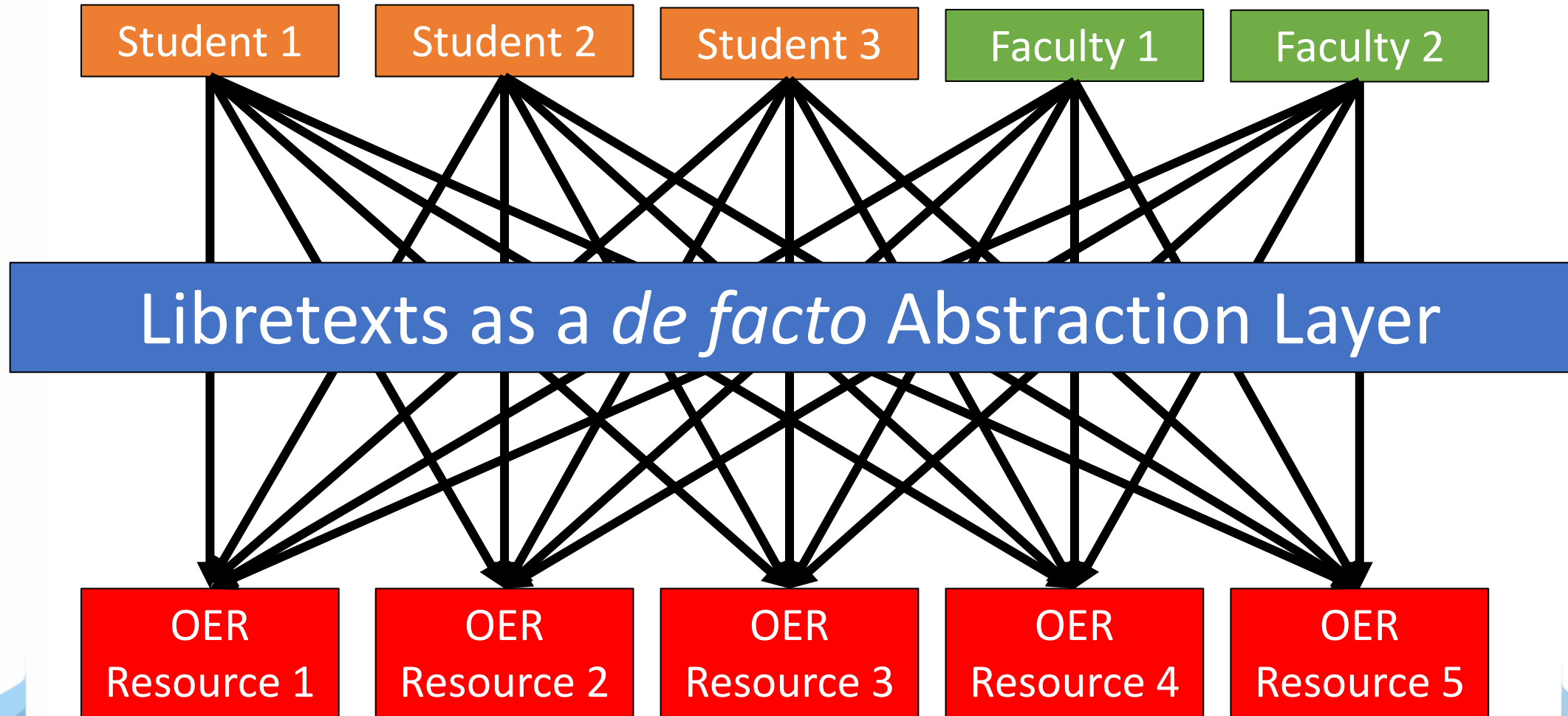
The **LibreVerse** is a centralized ecosystem of interconnected applications focusing on the construction, customization, distribution and usage of OER.



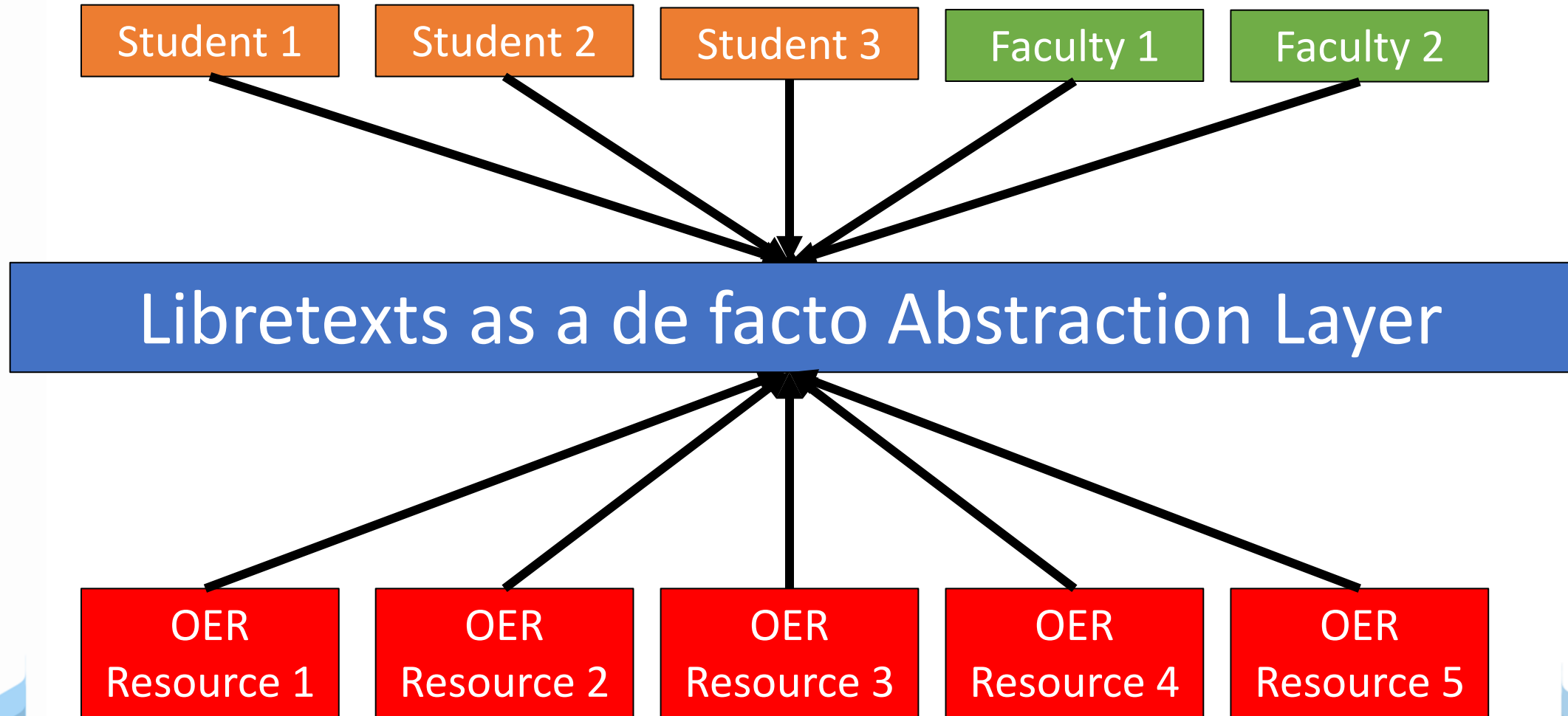
The Utility of Abstraction Layers



The Utility of Abstraction Layers



The Utility of Abstraction Layers



LibreTexts Impact

Total Pageviews
572,943,736

Total Time Studying (years)
4,482.75

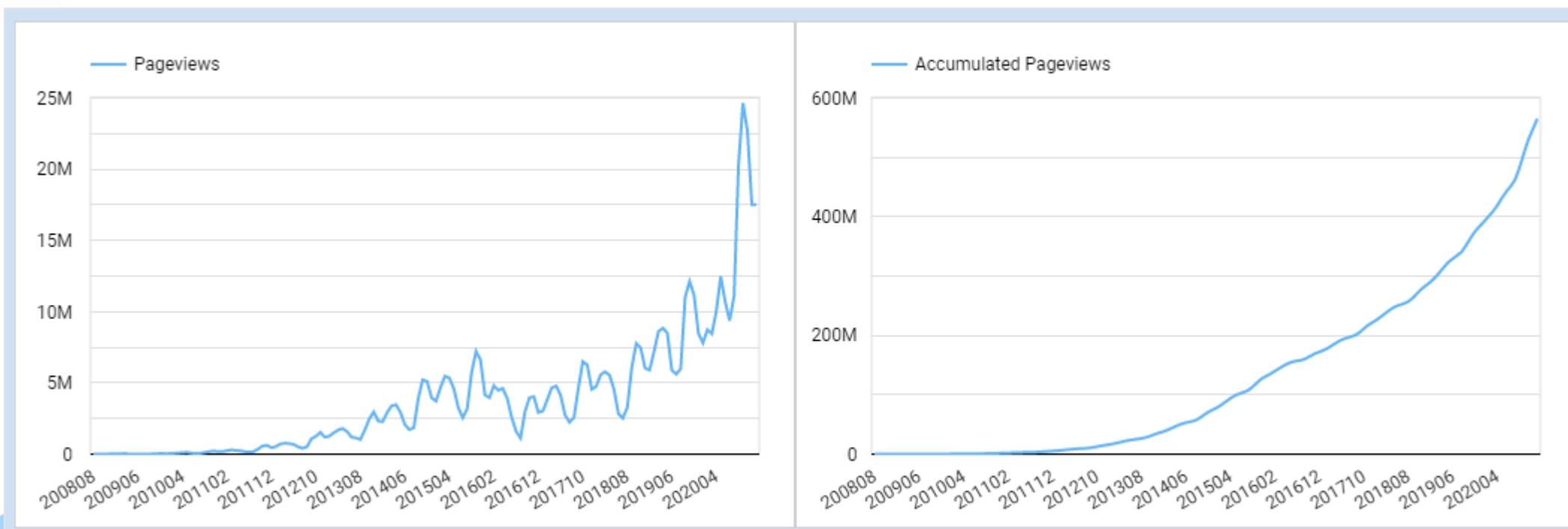
Pages of OER Content
312,214

Online Assessments
101,612

Remixable OER Texts (Bookshelves)
743

Customized Remixes (Courses)
480

Campus Hubs
289



EFFECTIVE USAGE OF 21ST CENTURY TECH REQUIRES 21ST CENTURY THINKING

*The Textbook of the Future is not the
Textbook of the past*

*We need to stop thinking about
building OER individual textbooks...*

*We need to start thinking about building
Interconnected OER “textlibraries”...*

Silos Compartmentalize Knowledge & Hinder Synergy



Our Textbook
should reflect
how we want
students to see
the world

Use the LibreTexts to build OER Texts



Just with any construction project, there are many options and many formats available for constructing a OER textbook.

Welcome to the Chemistry Library. This Living Library is a principal hub of the [LibreTexts project](#), which is a multi-institutional collaborative venture to develop the next generation of open-access texts to improve postsecondary education at all levels of higher learning. The LibreTexts approach is highly collaborative where an Open Access textbook environment is under constant revision by students, faculty, and outside experts to supplant conventional paper-based books.



Campus Bookshelves



Bookshelves



Learning Objects

The LibreTexts libraries are [Powered by MindTouch®](#) and are supported by the Department of Education Open Textbook Pilot Project, the UC Davis Office of the Provost, the UC Davis Library, the California State University Affordable Learning Solutions Program, and Merlot. We also acknowledge previous National Science Foundation support under grant numbers 1246120, 1525057, and 1413739. Unless otherwise noted, LibreTexts content is licensed by [CC BY-NC-SA 3.0](#). [Legal](#). Have questions or comments? For more [information](#) contact us at info@libretexts.org or check out our [status page](https://status.libretexts.org) at <https://status.libretexts.org>.

Bookshelves (Centrally Curated)

$$\begin{array}{r} 2 \\ 37 \overline{) 1260257} \\ 74 \end{array}$$

Arithmetic & Basic Math

$$a^2 + b^2 = c^2$$

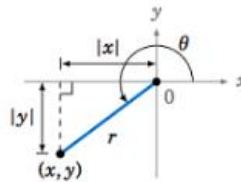
Pre-Algebra

$$\begin{array}{c} \text{2} \quad \text{1} \quad \text{2} \\ \downarrow \downarrow \downarrow \\ \text{3}x^2 - 2xy + c \\ \text{3} \quad \text{4} \quad \text{3} \quad \text{4} \quad \text{5} \end{array}$$

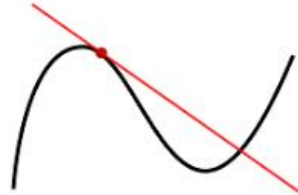
Algebra



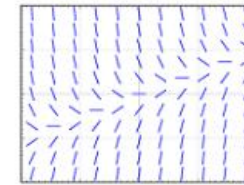
Geometry



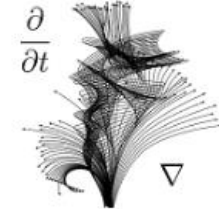
Precalculus & Trigonometry



Calculus



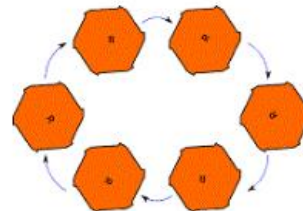
Differential Equations



Analysis



Linear Algebra



Abstract and Geometric Algebra



Combinatorics and Discrete Mathematics



Mathematical Logic and Proofs

Campus Bookshelves

(Locally Customized & Curated)



Austin Peay
State
University



Barton
Community
College



Borough of
Manhattan
Community
College



Coastline
College



College of
the
Canyons



Community
College of
Denver



CSU
Chico



De Anza
College



East
Tennessee
State
University



El Centro
College



Fort Hays
State
University



Georgia
State
University -
Perimeter
College



Grayson
College



Heartland
Community
College



Honolulu
Community
College



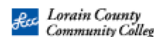
Instituto
Tecnológico de
Culiacán



Las Positas
College



Long Beach
City College



Lorain
County
Community
College



Lumen
Learning



Misericordia
University



Mission
College



Monroe
Community
College



Montana
State
University



Mount
Royal
University

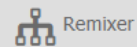
Learning Objects

(Interchangeable Building Blocks)



Adopted a LibreTexts for your class? Click here to let us know!

How can we help you?



Remixer



Downloads



admin



Sign in



Contents

Home

Learning Objects

Last updated: Feb 16, 2021



Readability



Learning objects are content items, practice items, and assessment items. These resources are self-contained, digital or non-digital resources that can be used for learning, education or training. Learning objects can be organized to easily form collections of themed content, including traditionally designed courses.



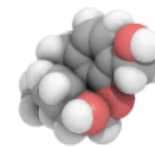
Laboratory Experiments



Demonstrations and Techniques



Exemplars and Case Studies



Interactive Applications



Worksheets

Easy Editing/Construction



Last updated: May 7, 2019, 1:49 PM by Delmar Larsen Page restriction: Public Page ID: 10594

◀ 1.2: The Nervous System | 1.4: The Brain and Nervous System ▶



Contributed by NOBA
Professor at <https://nobaproject.com/>
Sourced from [The Noba Project](#)

Edit View Format Style Elements Help

Words: 5497, Chars: 35497

Save X Cancel Undo Redo Heading B I U A A Ix List Bulleted Numbered Table Link Image Grid Search </> HTML

By Sharon Furtak

California State University, Sacramento

This module on the biological basis of behavior provides an overview of the basic structure of neurons and their means of communication. Neurons, cells in the central nervous system, receive information from our sensory systems (vision, audition, olfaction, gustation, and somatosensation) about the world around us; in turn, they plan and execute appropriate behavioral responses, including attending to a stimulus, learning new information, speaking, eating, mating, and evaluating potential threats. The goal of this module is to become familiar with the anatomical structure of neurons and to understand how neurons communicate by electrochemical signals to process sensory information and produce complex behaviors through networks of neurons. Having a basic knowledge of the fundamental structure and function of neurons is a necessary foundation as you move forward in the field of psychology.

LEARNING OBJECTIVES

- Differentiate the functional roles between the two main cell classes in the brain, neurons and glia.
- Describe how the forces of diffusion and electrostatic pressure work collectively to facilitate electrochemical communication.
- Define resting membrane potential, excitatory postsynaptic potentials, inhibitory postsynaptic potentials, and action potentials.
- Explain features of axonal and synaptic communication in neurons.

If you can edit in Canvas, then you can edit on the LibreTexts

Interactive Investigations for Augmented Learning

Wavefunctions and Probability Densities

```
import matplotlib.pyplot as plt
import numpy as np

# Defining the wavefunction
def psi(x,n,L): return np.sqrt(2.0/L)*np.sin(float(n)*np.pi*x/L)

# Reading the input variables from the user
n = int(input("Enter the value for the quantum number n = "))
L = float(input("Enter the size of the box in Angstroms = "))

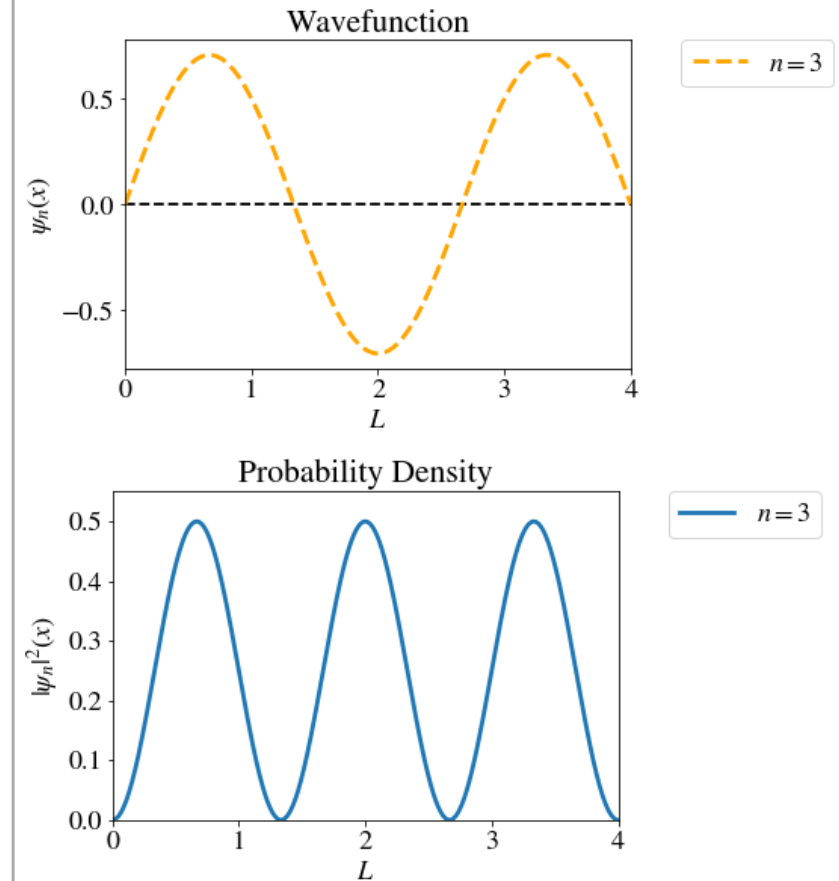
# Generating the wavefunction graph
plt.rcParams.update({'font.size': 18, 'font.family': 'STIXGeneral', 'mathtext.fontset': 'stix'})
x = np.linspace(0, L, 900)
fig, ax = plt.subplots()
lim1=np.sqrt(2.0/L) # Maximum value of the wavefunction
ax.axis([0.0,L,-1.1*lim1,1.1*lim1]) # Defining the limits to be plot in the graph
str1=r"$n = "+str(n)+r"$"
ax.plot(x, psi(x,n,L), linestyle='--', label=str1, color="orange", linewidth=2.8) # Plotting the wavefunction
ax.hlines(0.0, 0.0, L, linewidth=1.8, linestyle='--', color="black") # Adding a horizontal line at 0
# Now we define labels, legend, etc
ax.legend(loc=2);
ax.set_xlabel(r'$L$')
ax.set_ylabel(r'$\psi_n(x)$')
plt.title('Wavefunction')
plt.legend(bbox_to_anchor=(1.1, 1), loc=2, borderaxespad=0.0)

# Generating the probability density graph
fig, ax = plt.subplots()
ax.axis([0.0,L,0.0,lim1*lim1*1.1])
str1=r"$n = "+str(n)+r"$"
ax.plot(x, psi(x,n,L)*psi(x,n,L), label=str1, linewidth=2.8)
ax.legend(loc=2);
ax.set_xlabel(r'$L$')
ax.set_ylabel(r'$|\psi_n|^2(x)$')
plt.title('Probability Density')
plt.legend(bbox_to_anchor=(1.1, 1), loc=2, borderaxespad=0.0)

# Show the plots on the screen once the code reaches this point
plt.show()
```

run restart

Enter the value for the quantum number n = 3
Enter the size of the box in Angstroms = 4

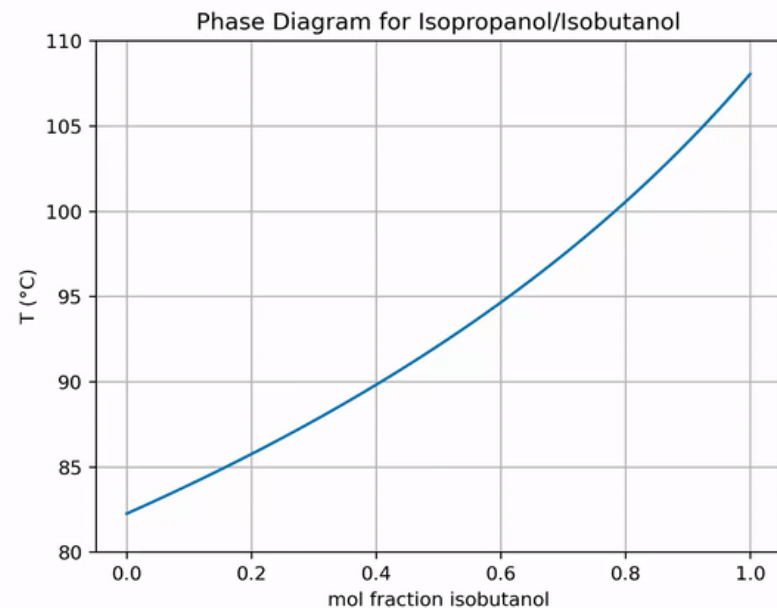


Flexibility + Community = Power



Free Radical
@Free_Radical1

Test of creating a distillation phase diagram/theoretical plates animation. Python/NumPy/SciPy/Matplotlib with imagemagick to create the GIF. Still needs work but all the pieces are in place.



8:08 AM · Jul 15, 2020 · Twitter Web App

2 Retweets 12 Likes



Delmar Larsen @LibreTexts · Jul 15

Replying to @Free_Radical1

It would be cool to have the composition of vapor and liquid phases as each plate indicated in a legend. Perhaps?

1



Free Radical @Free_Radical1 · 23h

Extras will be added. This was just a test to see that visual elements can be animated. May also edit as video with voiceover.



1



John Coupland @JohnNCoupland · Jul 15

Replying to @Free_Radical1

Very cool! Would love to get something like that for the freezing of sucrose solutions

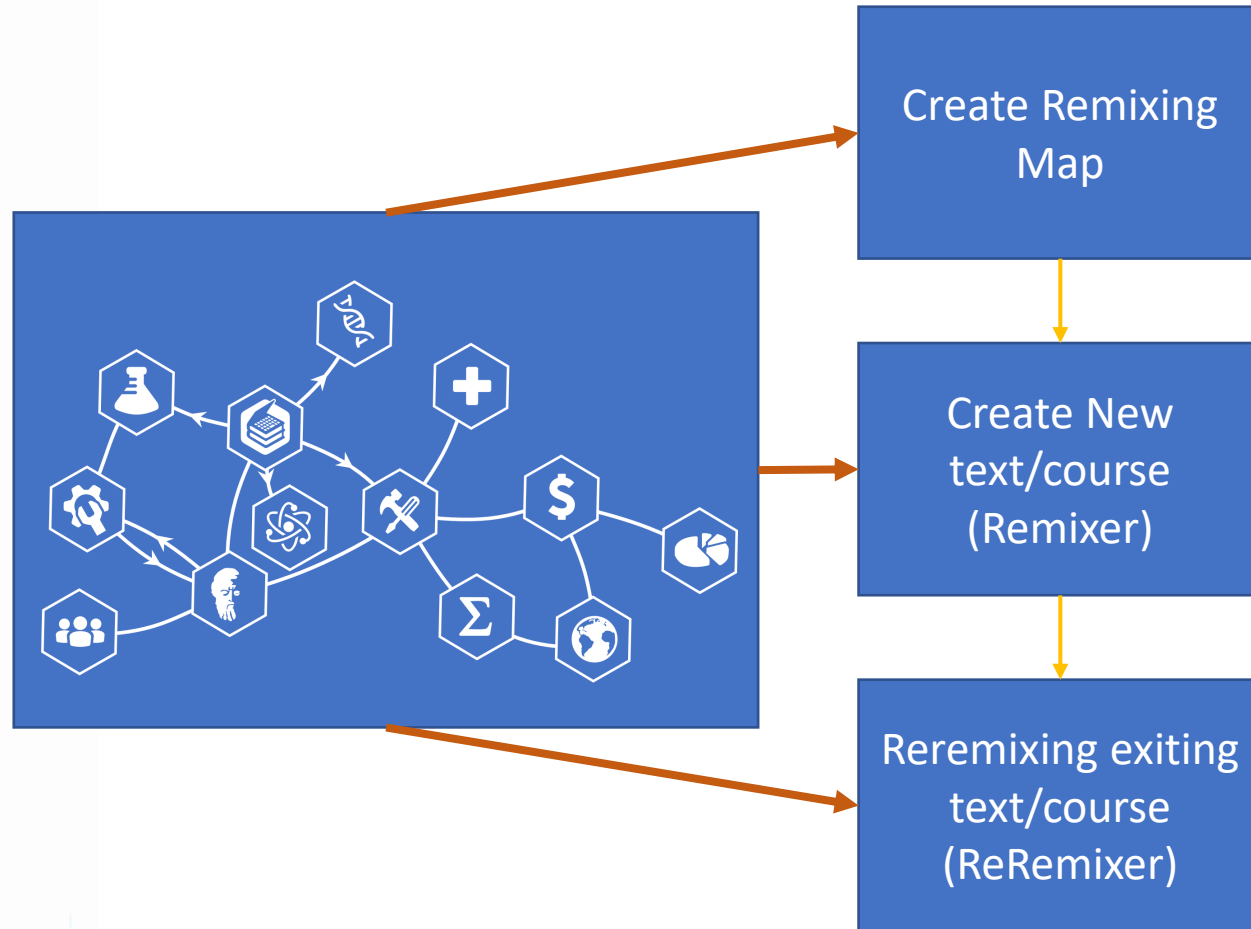


1



https://twitter.com/Free_Radical1/status/1283418265432272896

Harvesting the OER Universe



Integrate existing OER
Depository/Referatories into
LibreTexts

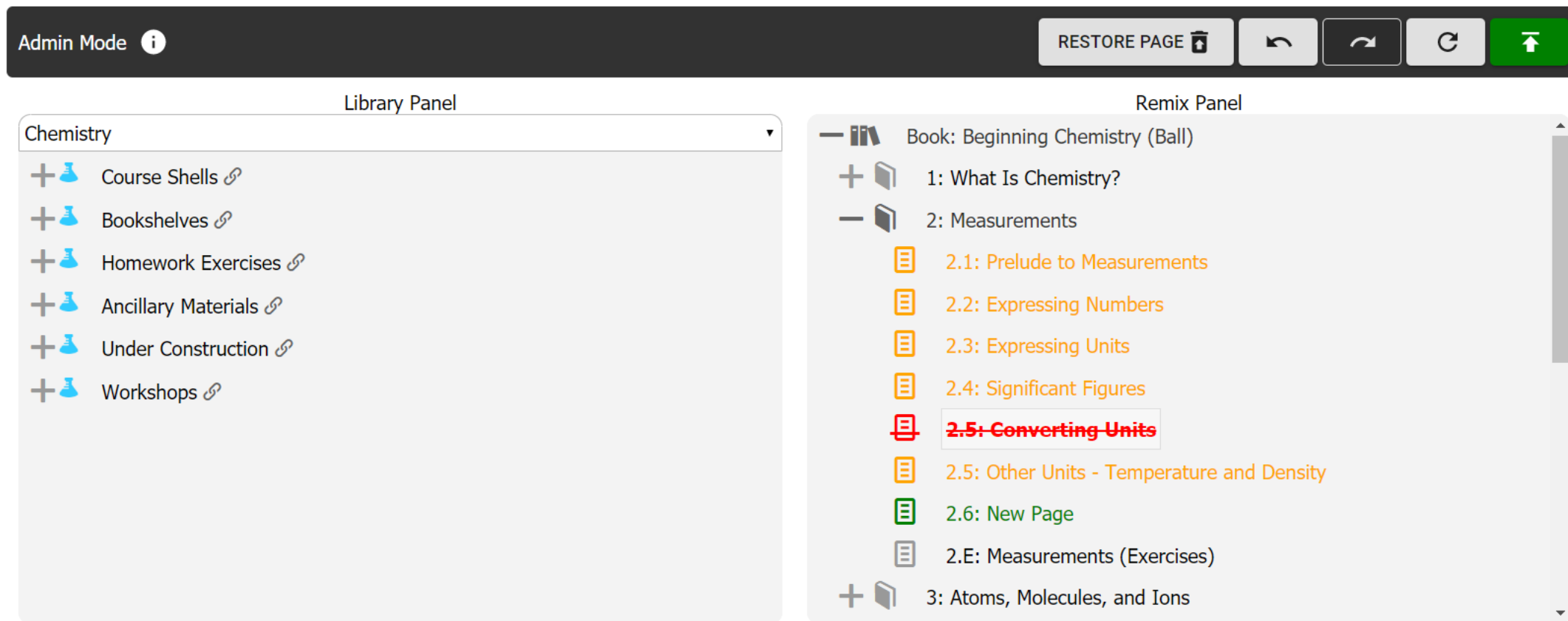
Edit and Typeset to Central
Standard

Cross reference and add
Meta-tags for content
curations

Build an OER Remixer to let
faculty rapidly construct
customizable texts

Step 2: The Remix

The OER [Remixer](#) is a self-service tool to rapidly assemble a LibreTexts from existing sources.



The screenshot displays the LibreTexts Remix interface. At the top, a dark header bar contains the text "Admin Mode" with an information icon, and a row of action buttons: "RESTORE PAGE" with a trash icon, a back arrow, a forward arrow, a refresh/circular arrow, and a green button with an upward arrow.

Below the header, the interface is divided into two main panels:

- Library Panel:** Features a dropdown menu currently set to "Chemistry". Below the menu is a list of items, each preceded by a plus icon and a flask icon, and followed by a link icon:
 - Course Shells
 - Bookshelves
 - Homework Exercises
 - Ancillary Materials
 - Under Construction
 - Workshops
- Remix Panel:** Displays a hierarchical tree structure of a book titled "Book: Beginning Chemistry (Ball)". The structure is as follows:
 - 1: What Is Chemistry?
 - 2: Measurements
 - 2.1: Prelude to Measurements
 - 2.2: Expressing Numbers
 - 2.3: Expressing Units
 - 2.4: Significant Figures
 - 2.5: Converting Units** (highlighted with a red box)
 - 2.5: Other Units - Temperature and Density
 - 2.6: New Page
 - 2.E: Measurements (Exercises)
 - 3: Atoms, Molecules, and Ions

Let's remix a book....

Open Licensing is Complicated & Confusing

Public Domain

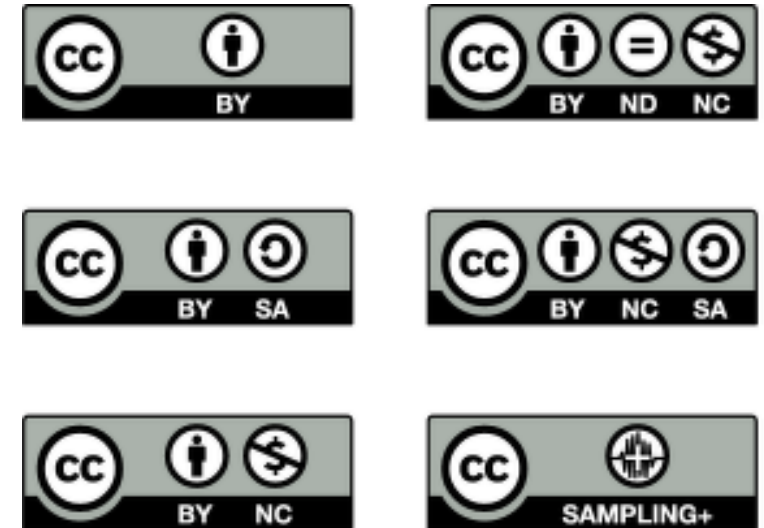


All works first published or released on or before December 31, 1924, have lost their copyright protection, effective January 1, 2020. (USA)

GNU General Public License



Creative Commons License



Creative Commons



**ATTRIBUTION
[BY]**

You let others copy, distribute, display, and perform your copyrighted work and derivative works based upon it - with credit.



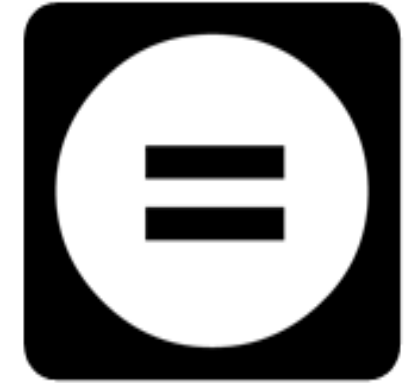
**SHARE ALIKE
[SA]**

You allow others to distribute derivative works only under a license identical to the license that governs your work



**NON-COMMERCIAL
[NC]**

You let others copy, distribute, display, and perform your work _ and derivative works based upon it - but for noncommercial purposes only



**NO DERIVATIVES
[ND]**

You let others copy, distribute, display, and perform only verbatim copies of your work, not derivative works based upon it.

How to Guide and Enforce Compliance

Early Warning System

Warn users that copy content about the permissions of that content.

- Implements

Controlled Copying

Restrict copying and pasting based on the permissions of the original content and the page to be pasted.

- Coming soon

Controlled Editing

Restrict access to editing a page to preserve permissions.

- Coming soon

Early Warning System

The content you just copied is CC BY-NC-SA licensed: You can can remix and distribute the work without profit as long as proper attribution is given and your work also comes with this same license. Learn more about this license [here](#)

The content you just copied is CC BY licensed: You can can remix and distribute the work as long as proper attribution is given. Learn more about this license [here](#)

The content you just copied is CC BY-NC-ND licensed: You can can share the work without profit if proper attribution is given, but cannot modify it in any way. Learn more about this license [here](#)

The AutoAttributor

Hot off the Presses from last night

AutoAttribution

- **Current page** by Patrick Fleming, is licensed All Rights Reserved Â©
- **1.2: Chemistry as a Science** by Anonymous, is licensed CC BY-NC-SA
- **11.4: transclude over libraries** by Mark Draganjac, is licensed CC BY-SA

” Get Page Citation

” Get Page Attribution

🔗 Toggle AutoAttribution

https://chem.libretexts.org/Under_Construction/Sandboxes/Henry/LibreLens

Active Accessibility

Brad Bot

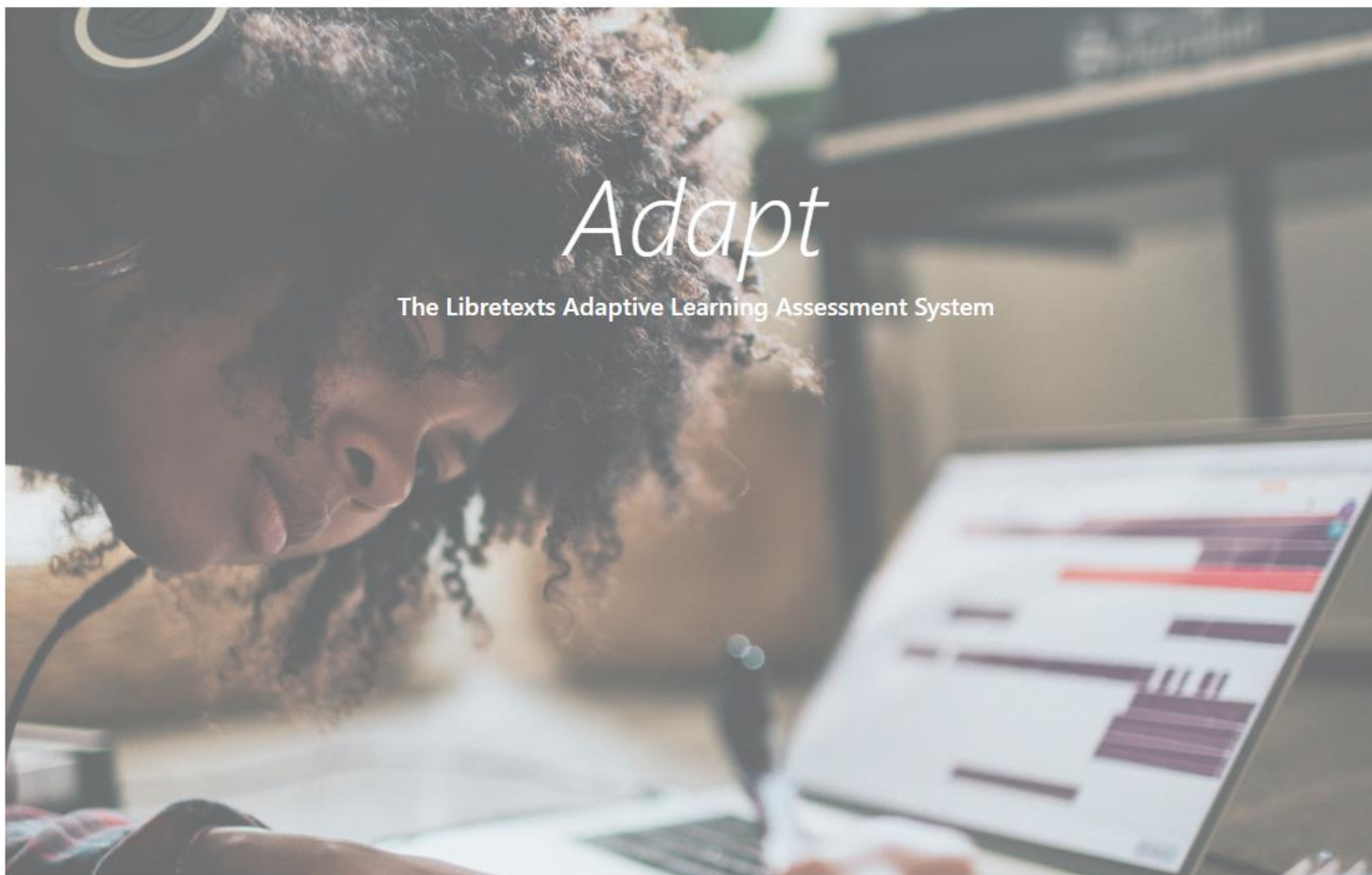


Centralized Code and Presentation
Currently 160 Checks per page

A11Y Bot



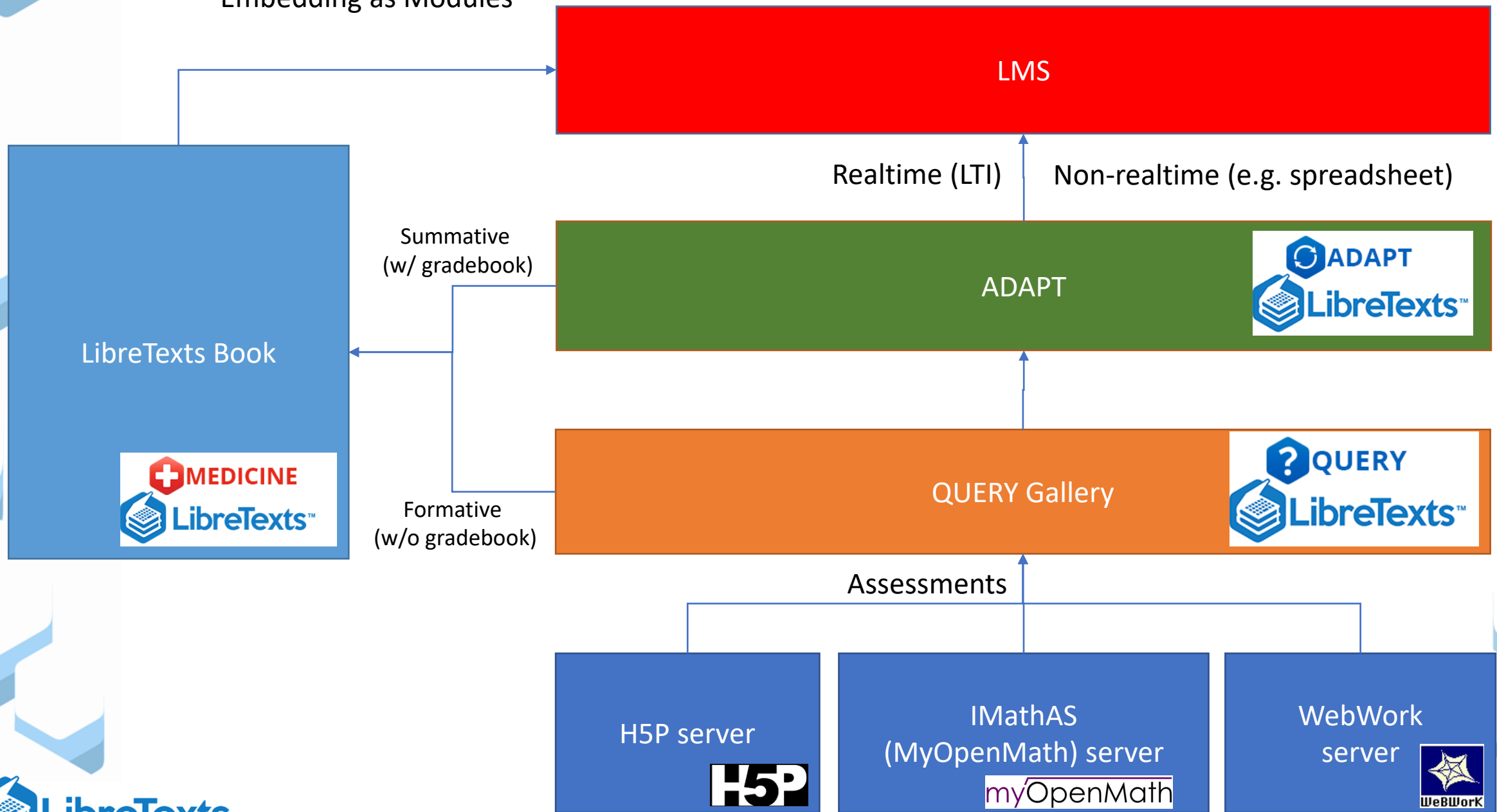
Implement accessibility changes
(not just a checker, but a “doer”)



Adapt


The Libretexts Adaptive Learning Assessment System

Embedding as Modules




The Query Gallery

<https://query.libretexts.org>



QUERY




BeeLine Reader

Check out the new BeeLine Reader on LibreTexts: Making Online Reading Much Easier

[Biology](#) [Business](#) [Chemistry](#) [Engineering](#) [Español](#) [Geosciences](#) [Humanities](#) [Mathematics](#) [Medicine](#) [Physics](#) [Social Sciences](#) [Statistics](#) [Workforce](#)


[Sign in](#)

 [Home](#)


Assessment Gallery

Last updated: Mar 2, 2020


[f](#) [t](#) [Donate](#)




H5P Assessments



IMathAS Assessments



WeBWork Assessments



Centralized Search Capability

Title & Description

Filter by keywords in title and description.

Type

The type of content to search for...

Keywords

Filter by author-supplied tags

Subject

Business & Management
The Arts
Computing & IT
Law
Earth & the Environment
Health & Development
History
Language & Linguistics
Literature
Mathematics & Sciences

Author

Search by author name...

License

CC BY
CC BY-SA
CC BY-ND
CC BY-NC
CC BY-NC-SA
CC BY-NC-ND

Browse

Open Problem Library

Local Problems

From This Course

Set Definition Files

or Problems from

Contrib

OPL Directory

CAPA

All Selected Constraints Joined by "And"

Subject:

All Subjects

Update Menus

Chapter:

All Chapters

Reset

Section:

All Sections

Basic Search

Textbook:

All Textbooks

Text chapter:

All Chapters

Text section:

All Sections

Level:

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

?

Keywords:

View Problems

Display Mode:

MathJax

Max. Shown:

20

☐ Hints

☐ Solutions

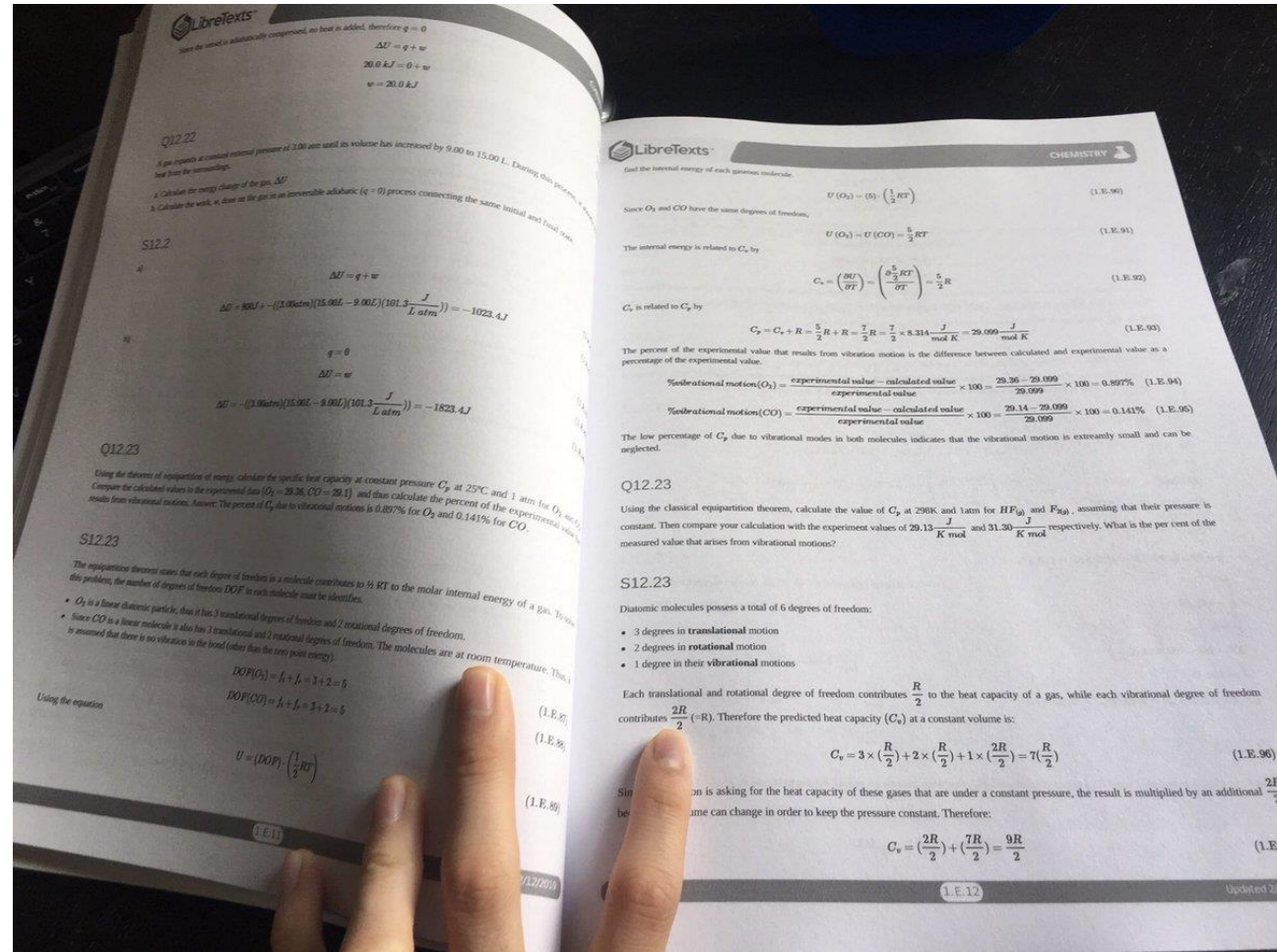
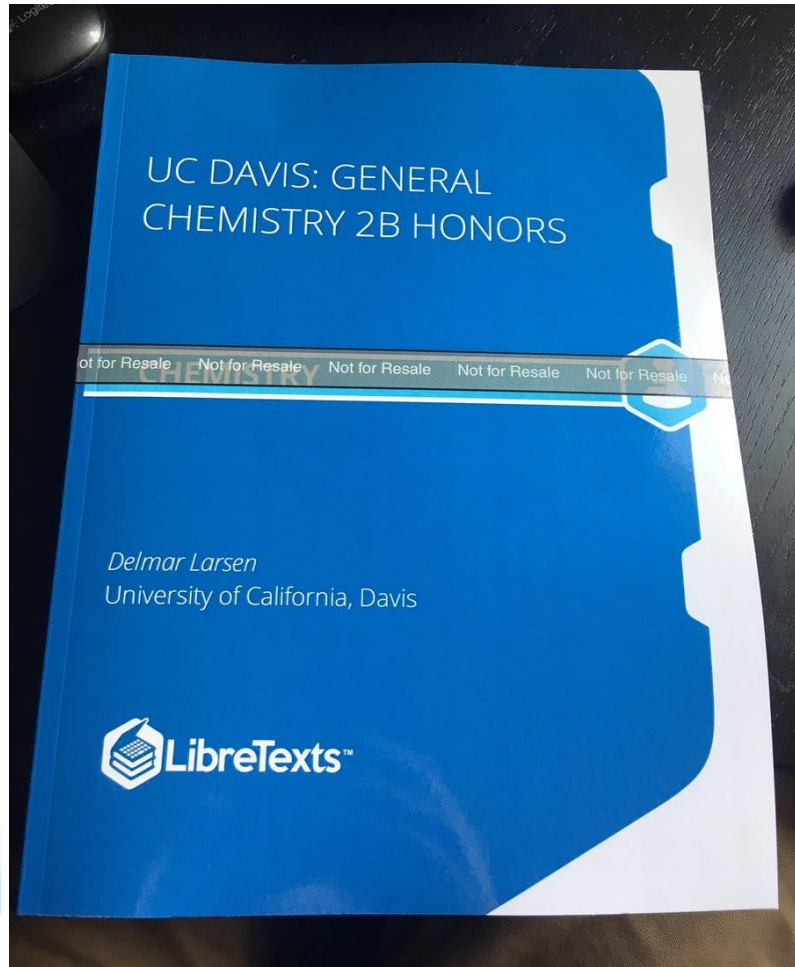
There are 37517 matching WeBWork problems

Institution
College of the Canyons
Authors
Title or Tag
LIBRARIES

Number of Entries 100 ▼ 1-31 of 31 < >

College of the Canyons Bio 221Lab: Introduction to Microbiology Kelly C. Burke	College of the Canyons El rol de la equidad y la diversidad en la educación de la primera infancia Esquivel, Elam, Paris, & Tafoya	College of the Canyons Desarrollo y crecimiento en la niñez Paris, Ricardo, Rymond y Johnson	College of the Canyons Niñez, familia, y comunidad Rebecca Laff & Wendy Ruiz	College of the Canyons Introducción al plan de estudios para la educación en la primera infancia Paris, Beeve, y Springer
College of the Canyons Math 100: Liberal Arts Mathematics Alex Gavilan & Trudi Radtke	College of the Canyons Math 130: Math for Elementary School Teachers Amy Lagusker	College of the Canyons Health Education Garrett Rieck & Justin Lundin	College of the Canyons Physci 101 Lab: Physical Science Laboratory Investigations Teresa Ciardi	College of the Canyons Anthro 130: Physical Anthropology Sarah Etheredge
College of the Canyons COMS 100: Process of Communication Tammera Stokes Rice	College of the Canyons COMS 120: Small Group Communication Kerry Osborne	College of the Canyons COMS 246: Interpersonal Communication Victoria Leonard & Tammera Stokes Rice	College of the Canyons Psych 172: Developmental Psychology Neil Walker Fredrick Bobola	College of the Canyons Communications 256: Intercultural Communication Tammera Stokes Rice

Dissemination: Physical Texts



Physical Textbooks

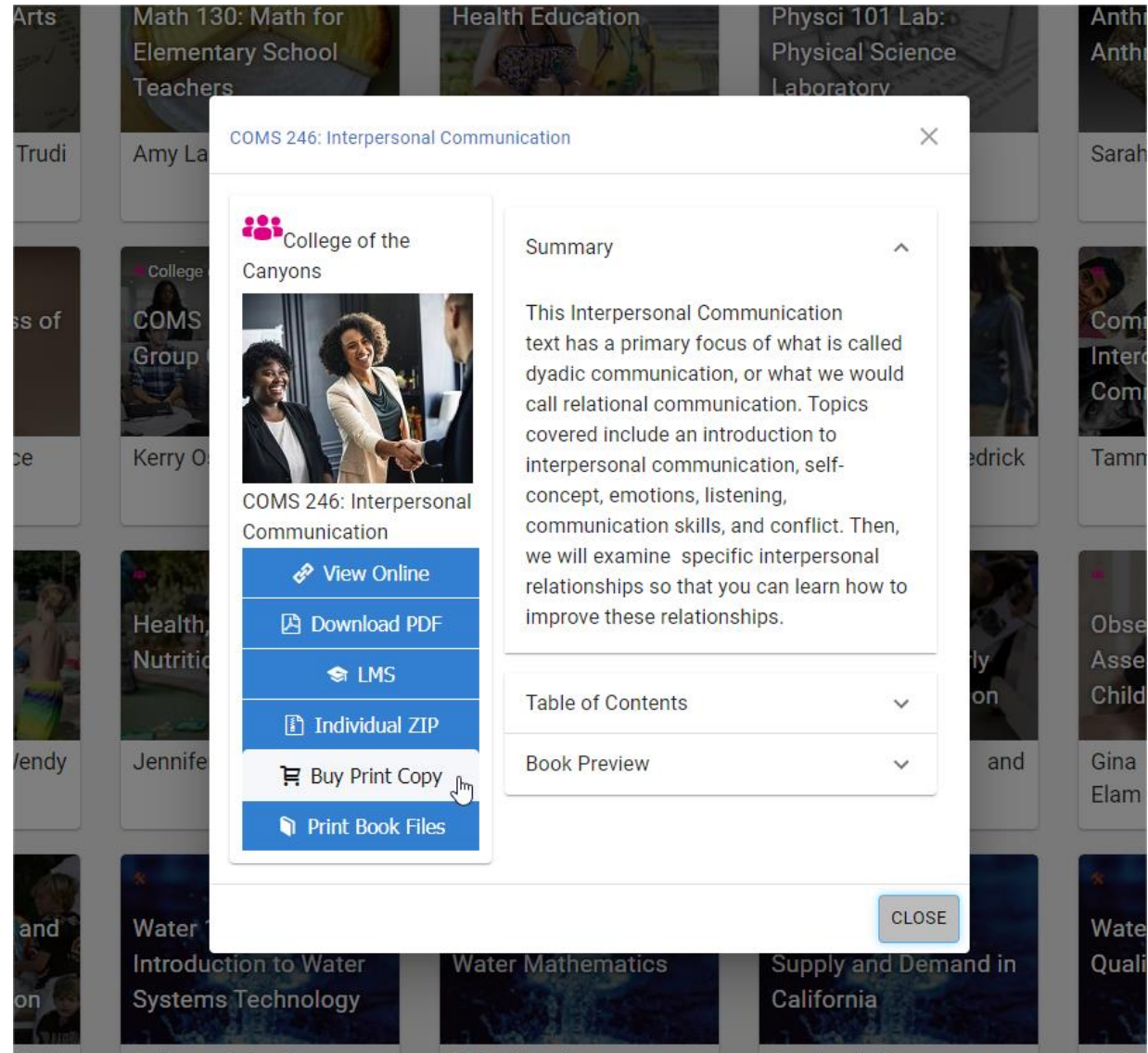
Dissemination: Online Campus Stores

Centrally located Collection
of Campus branded OER
texts

Available for rapid print-on-
demand for students/faculty

At cost – pay only printer
and shipping

Branded and Dynamic for
Faculty and Campus



Dissemination: LibreTexts in a Box

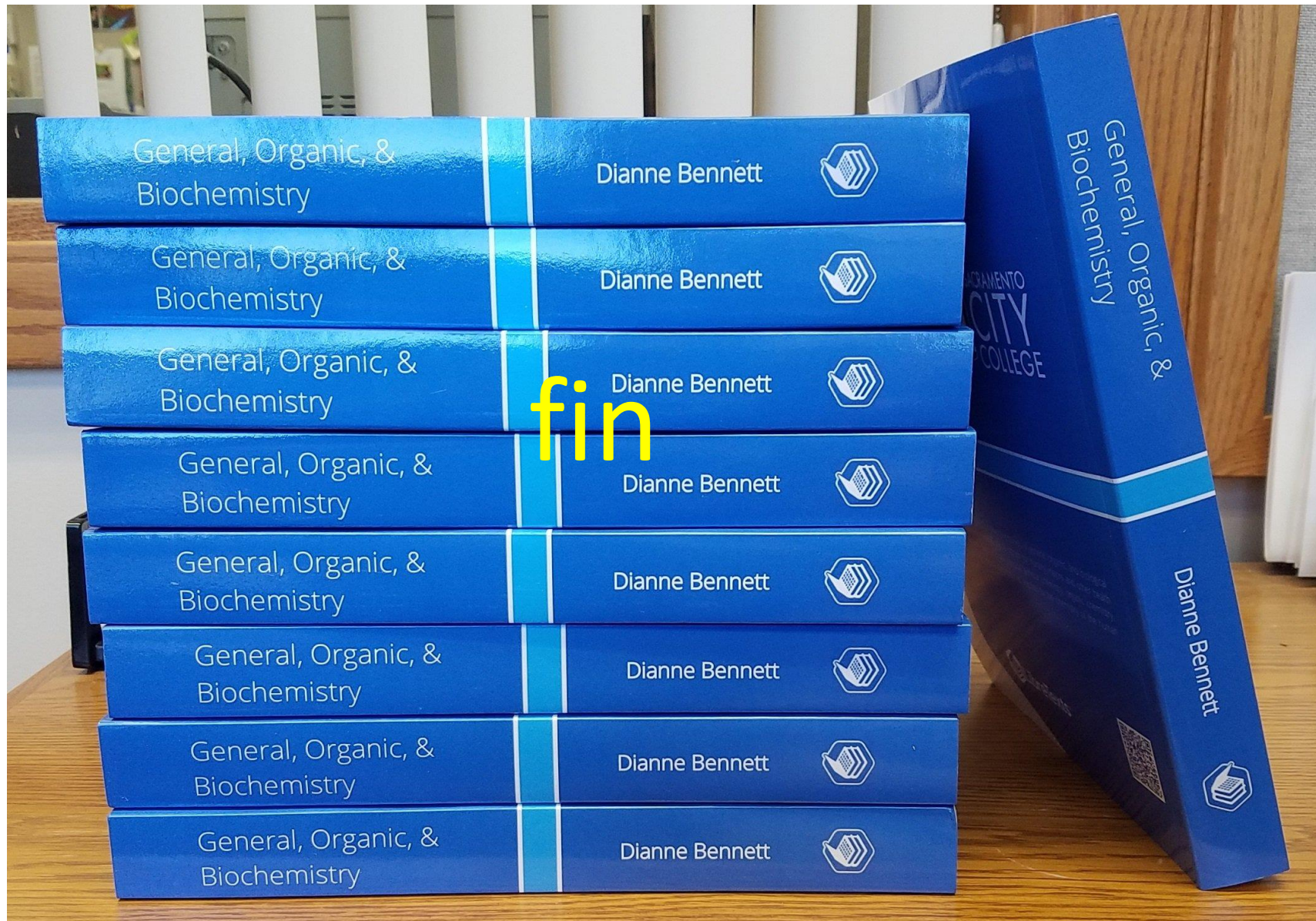
The internet is only available to a little over half of the world's population. The people who typically need these online resources the most, are the very people most likely to lack access to the internet.



Internet-Free LibreTexts

The LibreTexts Mission

Implementing a **Community** built OER platform that is **Comprehensive** and can be **Curated** at multiple levels.



Adapt and Query

Introducing the LibreTexts Comprehensive Summative Homework Assessment System

Delmar Larsen

Executive Director, LibreTexts
Professor, Department of Chemistry,
University of California, Davis



<http://Libretexts.org>



<https://facebook.com/Libretexts>



<https://twitter.com/libretexts>



<https://www.youtube.com/LibreTexts>



Humanities library:

username: SpanishRocks

Password: LibreTexts!

Query me this ...

How do you build an online homework system that complements the utility of the LibreTexts Infrastructure and is:

- Flexible,
- Dynamic,
- Comprehensive,
- Integrated,
- LMS agnostic, &
- Powerful
- and free or nearly free?

Slowly and Efficiently

Don't reinvent the wheel!

IBM.



Feature/Goals of ADAPT

- Auto-graded Question (Computer grading)
- Open-Ended Question (Human grading)
- Formative (Not coupled to a Gradebook)
- Summative (Coupled to a Gradebook)
- Direct Application Usage (students log into ADAPT.LibreTexts.org)
- Indirect Textbook Usage (Embedded inside your Textbook)
- LMS Usage (used within LMS' internal quiz system and Gradebook)
- Classroom Usage (Clickers)

Two Side of the Same Coin



<https://query.libretexts.org>

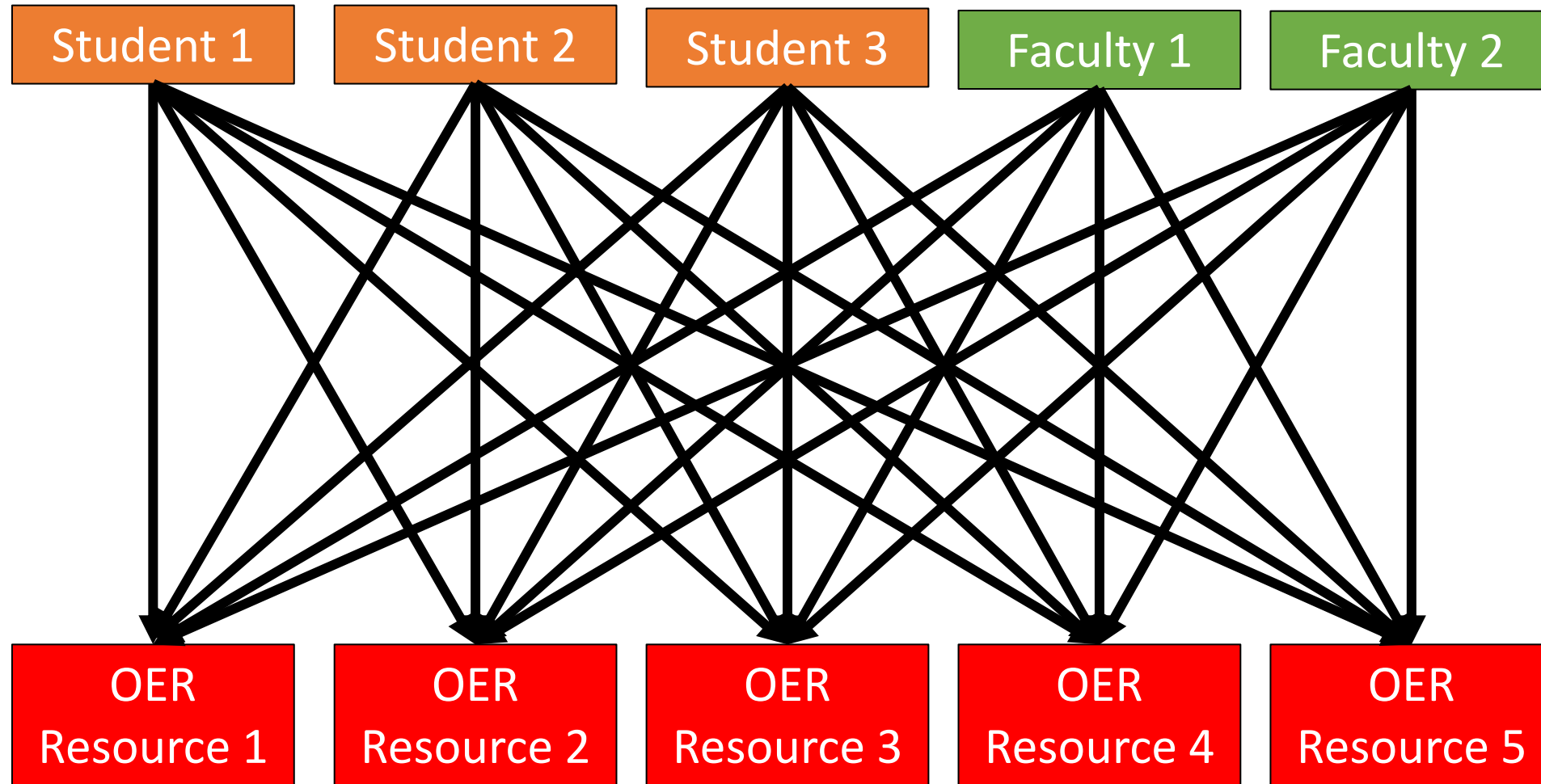
- Acts a centralized location for community assessments
- Open problems for formative and faculty-only problems for summative use
- Can be embedded directly into textbooks pages



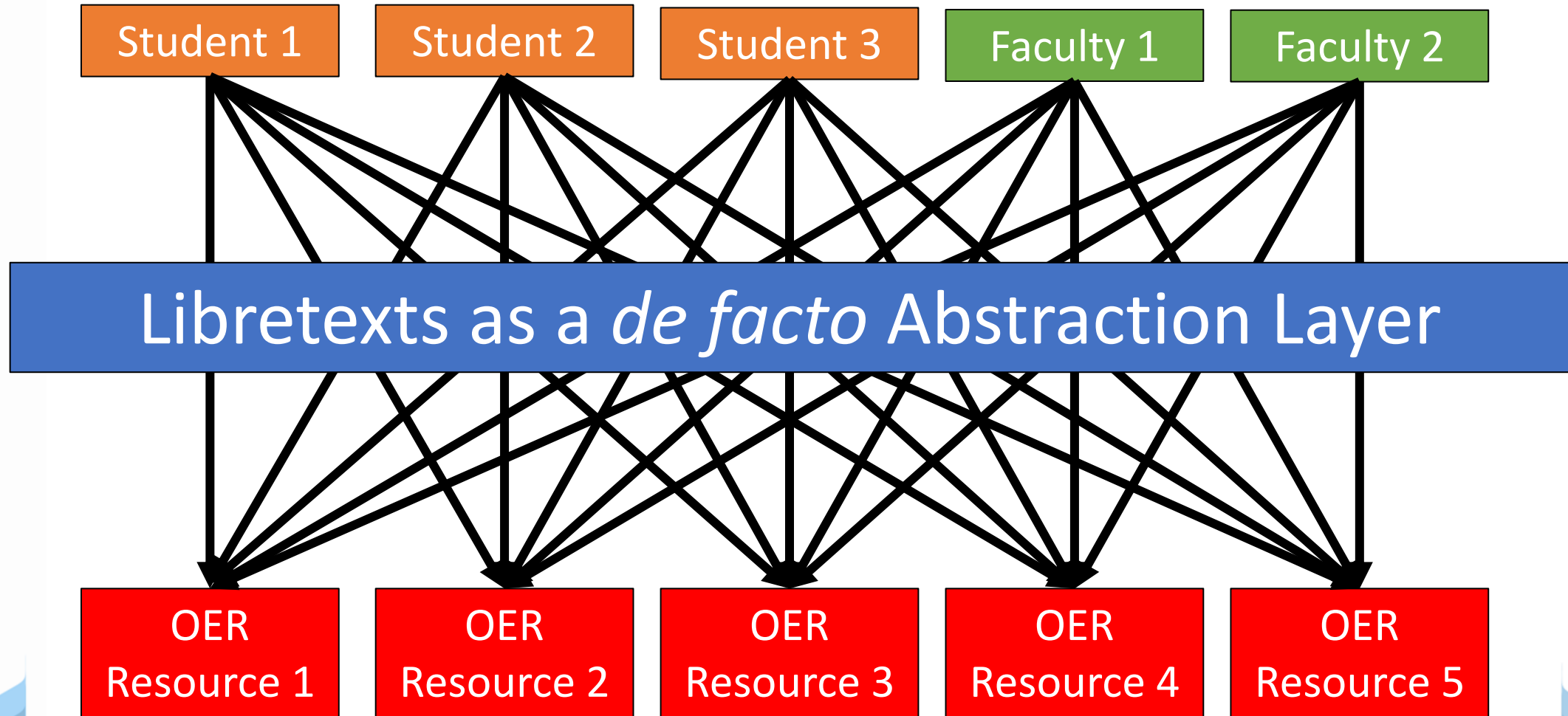
<https://adapt.libretexts.org>

- The summative assessment application
- Designed for autograded and open-ended questions (i.e., file update) and adaptive learning, and Culturally Responsive Teaching and Learning
- Used as a centralized system for in-class clickers, quizzing/exams, student analytics and laboratory reports

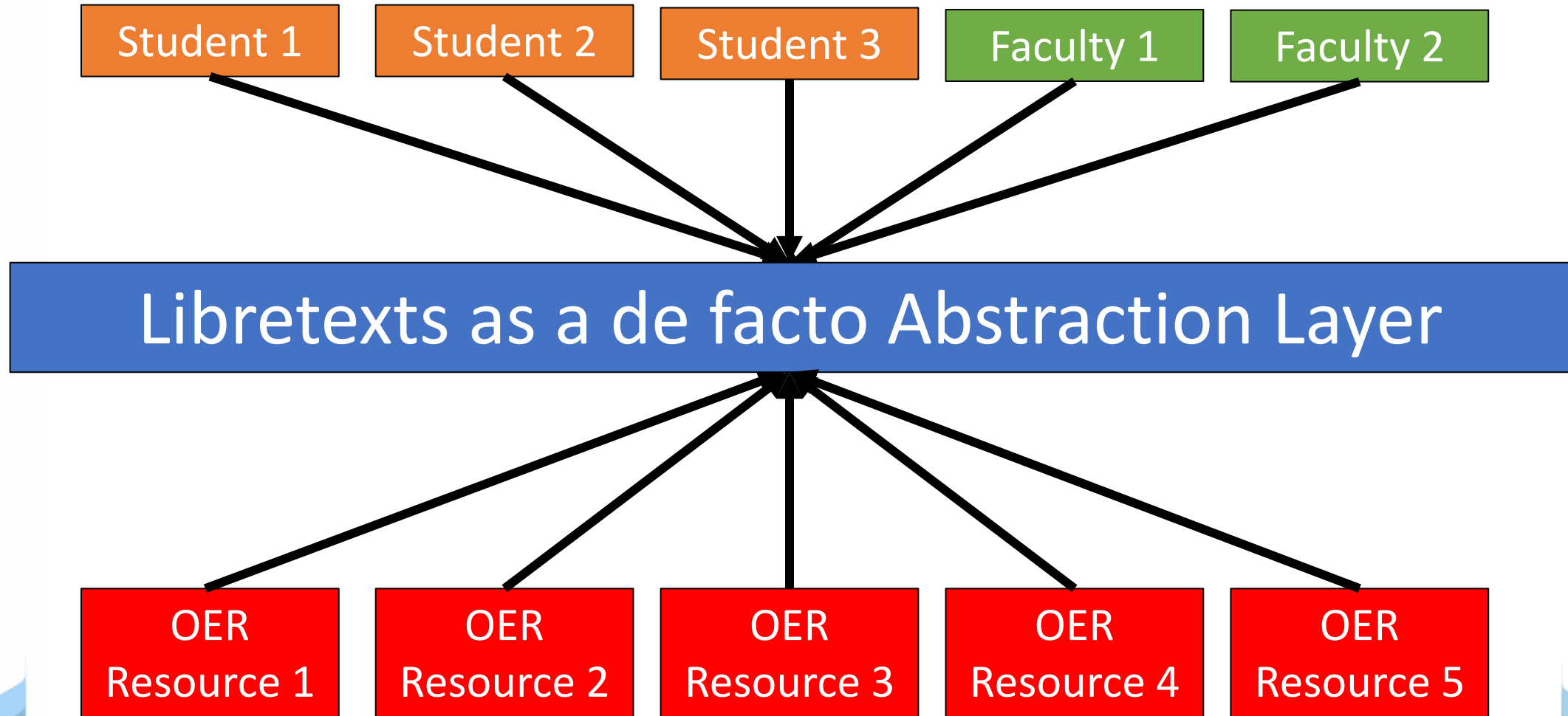
The Utility of Abstraction Layers



The Utility of Abstraction Layers



The Utility of Abstraction Layers



Different Technologies for Different Purposes

WebWork



WebWork is an online homework delivery system primarily used for mathematics and science.

Server-side Evaluation

<https://webwork.maa.org/>

IMathAS

MyOpenMath
Lumen's OHM - Online
Homework Manager

IMathAS is primarily a web-based math assessment tool for delivery and automatic grading of math homework and tests.

Server-side Evaluation

<https://www.imathas.com/>

H5P

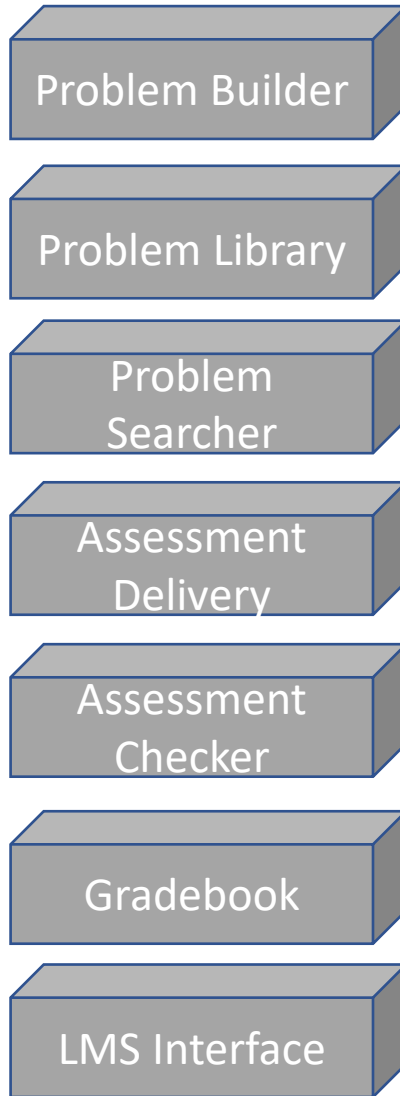


H5P is a free and open-source content collaboration framework based on JavaScript.

Client-side Evaluation

<https://h5p.com/>

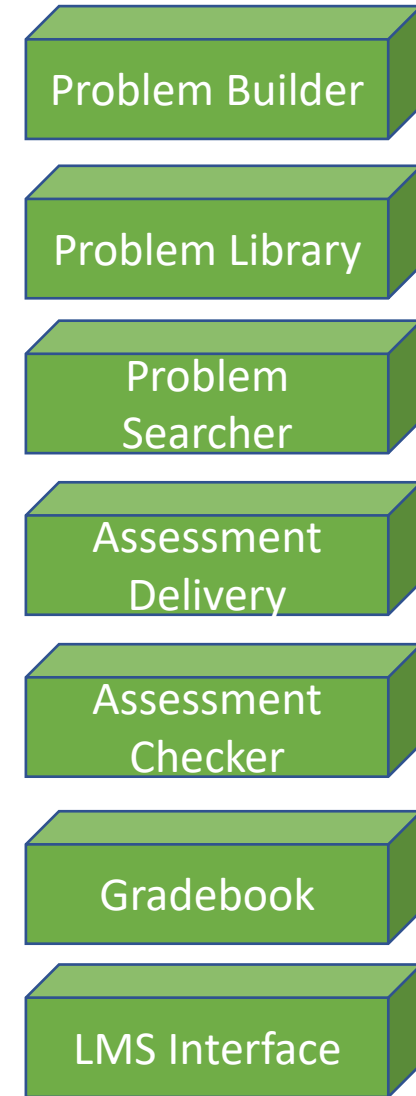
WebWork



IMathAS



H5P



WebWork

IMathAS

H5P

Problem Builder

Problem Builder

Problem Builder

Centralized Problem Library (<https://query.libretext.org>)

Centralized Search Capability

Assessment
Delivery

Assessment
Delivery

Assessment
Delivery

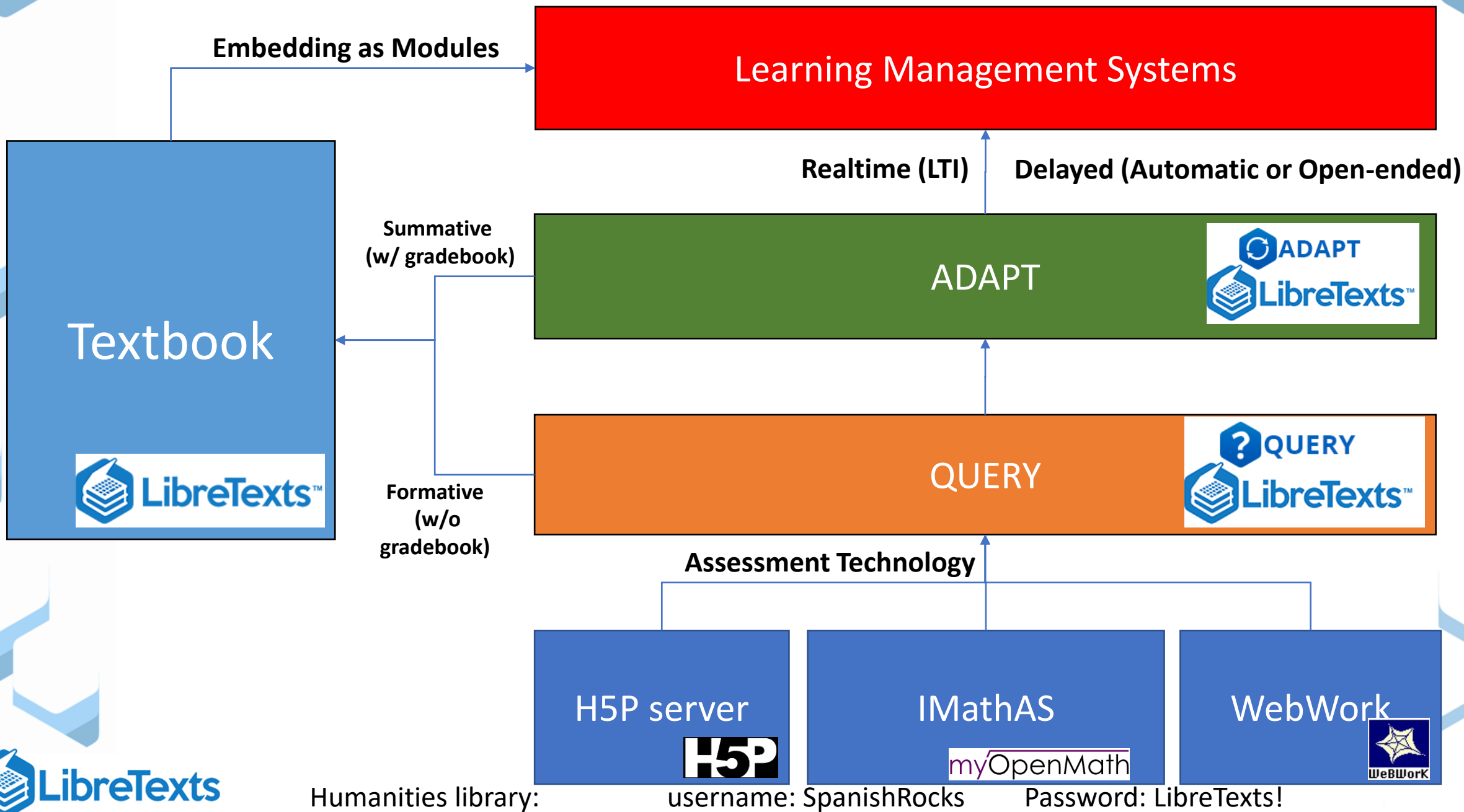
Assessment
Checker

Assessment
Checker

Assessment
Checker

Centralized Grade Book

Centralized LMS Interface



Centralized Search Capability

Title & Description

Filter by keywords in title and description.

Type

The type of content to search for...

Keywords

Filter by author-supplied tags

Subject

Business & Management
The Arts
Computing & IT
Law
Earth & the Environment
Health & Development
History
Language & Linguistics
Literature
Mathematics & Sciences

Author

Search by author name...

License

CC BY
CC BY-SA
CC BY-ND
CC BY-NC
CC BY-NC-SA
CC BY-NC-ND

Browse

or Problems from

All Selected Constraints Joined by "And"

Subject:

Chapter:

Section:

Textbook:

Text chapter:

Text section:

Level: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

Keywords:

Display Mode: Max. Shown: ☐ Hints ☐ Solutions

There are 37517 matching WeBWork problems

