

HydroLearn: An Online Platform For Collaborative Development and Sharing of Active Learning Resources in Hydrology Education

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WHAT IS HYDROLEARN?

An open source, online platform that is a living repository of digital active learning resources guided by evidence-based pedagogical best practices

OBJECTIVES

Primary objective?

- Promote problem based and active learning in Hydrology and Water Resources

How do we get there?

- Support instructors to develop pedagogically sound learning objectives and frame learning material to achieve those objectives
- Share and collaborate in the development of learning content
- Allow others to use developed learning content and draw upon the content of others

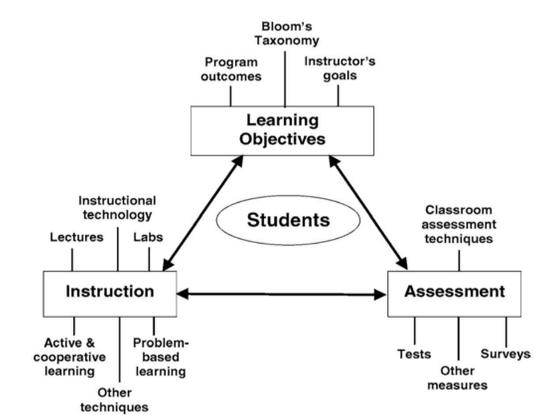
Our audience?

- Instructors for college level undergraduate and graduate students
- Subject areas: hydrology, hydraulics, water engineering, water resources, etc

STUDENT CENTERED LEARNING

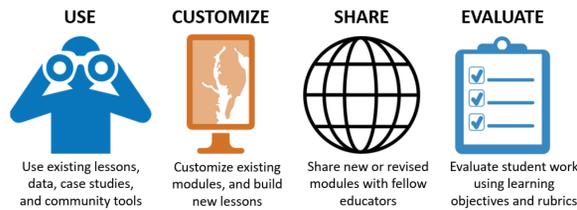
HydroLearn challenges traditional instructional methods by promoting more effective techniques of educating tomorrow's engineers:

- Instruction is tailored to our discipline
- Students demonstrate they have the knowledge and skills they are expected to learn
- Students have the flexibility to learn anytime and anywhere



Felder, R.M., Brent, R. (2003). "Designing and Teaching Courses to Satisfy ABET Engineering Criteria." *Journal of Engineering Education*, 92(1), 7-25.

We want to enable instructors to use, customize, develop, and share active-learning innovations, and alleviate existing barriers against sustained adoption.



INSTRUCTOR SUPPORT

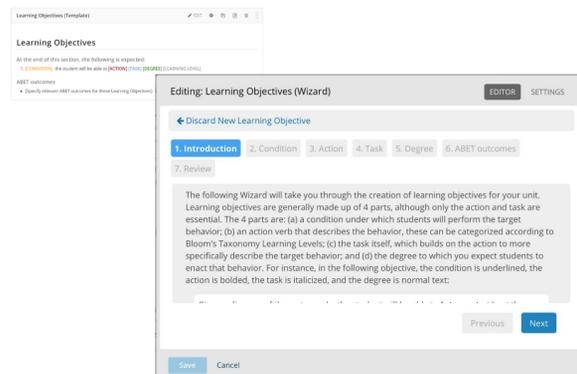
Research-based pedagogical practices

HydroLearn combines active learning techniques with authentic online modules and tools to support implementation of sound pedagogical practices.

Pedagogical Practices	Tools to Support
Active Learning	Variety of components/content Learning Activity template
Authentic Learning	Problem-based Integration with external tools and apps
Set clear and high expectations for learners	Learning Objective Wizard/Template Rubric Template Connect to Bloom's Taxonomy and ABET student outcomes

Learning objective tools

Support instructors in developing clear, concise learning objectives



Objectives can support new ABET/ASCE outcomes:

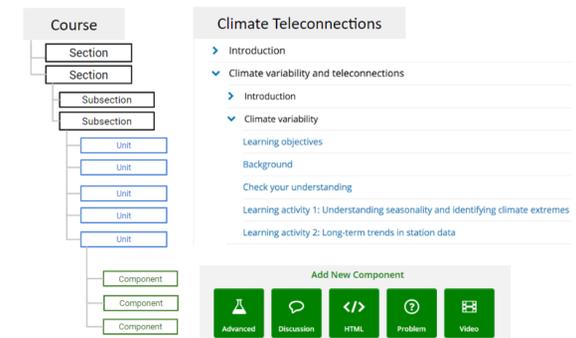
An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

PLATFORM ATTRIBUTES

Platform design

HydroLearn is designed in a modular and hierarchal way based on the following criteria:

- Enabling interoperability and integration with well-established data sharing and publishing tools developed by the hydrologic research community
- Supporting customization so that faculty users can create their own content modules
- Enabling collaboration, sharing, and contribution of learning content with an open-source approach.



The four C's of sustainability

Contributing:

- Share an entire course with other instructors
- Clone existing courses

Collaboration:

- Add collaborators to your module

Customization:

- Customize course elements within and across different modules
- Other instructors can customize your course for their needs

Compatibility:

- Expose your module contents on your own Learning Management System

Types of Content

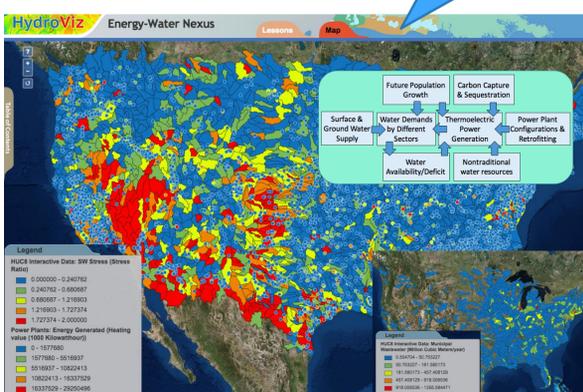
- Text editing
- Pedagogical support
 - Learning Objectives
 - Rubrics
- Embedding Apps
 - Checkbox
 - Dropdown
 - Multiple Choice
 - And more!
- Videos
- Discussion

SEED MODULES

Illustrative seed learning modules

- Rainfall-Runoff-Streamflow processes
- Design of flood protection measures
- Water-Energy-Food Nexus
- Twelve seed modules
- Other contributions welcome!

A few examples...



EOS Earth & Space Science News
New Online Tool Teaches Students About the Energy-Water Nexus

Hydrologic Design using HEC-HMS: Beau Bassin Watershed, LA



Problem:

- Flash flooding in urbanized area of Louisiana
- Design of flood protection infrastructure to protect from impacts
- Based in Carencro, LA

HydroLearn Appeal:

- A problem typical of what engineering hydrologists face
- Learn by doing the hydrology for the design
- Introduce essential subject matter "Just in time" in the context of solving the problem
- Exposure to industry tools

PILOT LEARNING MODULE

Surveyed 36 undergraduate students doing HydroViz Dry Canyon Module (2018) using a Student Course Engagement Survey:

Time 1: Just before implementation of module

Time 2: Just after implementation of module, right before finals

Means, Standard Deviations, and Difference Testing (n=36)		
	Time 1	Time 2
Skills	3.88 (0.51)	4.01 (0.63)
Emotional	3.54 (0.58)	3.77* (0.69)
Participation/Interaction	3.11 (0.76)	3.50** (0.72)
Performance	3.86 (0.75)	3.81 (0.90)

FELLOWSHIP PROGRAM

Purpose

- Support in learning about active learning and problem based learning pedagogy
- Support in implementing these principles into modules
- Collect data on use, issues, etc to inform improvements to the platform
- Support and monitor data collection



WANT TO (HYDRO) LEARN MORE?



HYDROLEARN.org

