HydroLearn: Facilitating the Development, Adaptation and Sharing of Active-Learning Resources in Hydrology Education

Emad Habib  
*University of Louisiana at Lafayette*

Melissa Gallagher  
*University of Louisiana at Lafayette*

Jenny Byrd  
*University of Louisiana at Lafayette*

Olivia LaHaye  
*University of Louisiana at Lafayette*

Cary Rivet  
*University of Louisiana at Lafayette*

Micah LaCombe  
*University of Louisiana at Lafayette*

[Recommended Citation](https://digitalcommons.usu.edu/cee_facpres)

This Presentation is brought to you for free and open access by the Civil and Environmental Engineering at DigitalCommons@USU. It has been accepted for inclusion in Civil and Environmental Engineering Faculty Presentations by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.
Authors
Emad Habib, Melissa Gallagher, Jenny Byrd, Olivia LaHaye, Cary Rivet, Micah LaCombe, David Tarboton, Scott Black, and Dan Ames

This presentation is available at DigitalCommons@USU: https://digitalcommons.usu.edu/cee_facpres/3
An Open-Source Platform for Developing, Sharing and Adaptation of Active-learning Resources in Hydrology and Water Resources

Emad Habib, Melissa Gallagher, Jenny Byrd, Olivia LaHaye, Cary Rivet, Micah LaCombe (UL Lafayette)
David Tarboton and Scott Black (USU)
Daniel Ames (BYU)
Welcome to the HydroLearn platform.

Empowering educators to collaboratively develop, customize, and share active-learning resources in hydrology and water resources engineering, and improve student learning.

Explore
Explore existing courses, case studies, and learning activities and use in classrooms

Customize
Customize existing courses and learning activities, or build new ones

Share
Share back learning resources for instructors to use

Instructional Design Support
Create high quality learning outcomes and rubrics to support student learning

FELLOWSHIP OPPORTUNITY

Are you a Hydrology instructor interested in engaging with us in
What is HydroLearn?

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

**EXPLORE**
Access lessons, data, case studies, and community tools

**CUSTOMIZE**
Customize existing modules, and build new lessons

**SHARE**
Share modules with fellow educators and students

**EVALUATE**
Evaluate student work using learning objectives and assessment rubrics
What is HydroLearn? Support Student Learning

Illustrative seed courses developed to **support student learning** in:

- Rainfall-Runoff-Streamflow processes
- Design of flood protection measures
- Flood warning and forecasting
- Water-Energy-Food Nexus
- Other hydrology and water resources contributions welcome

Outcomes can support new **ABET/ASCE** criteria:

*an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics*
HydroLearn: Research-based pedagogical practices

Hydrolearn combines active learning methods with authentic online learning modules & tools to **support implementation of sound pedagogical practices**

<table>
<thead>
<tr>
<th>Pedagogical Practices</th>
<th>HydroLearn Tools to Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Learning</td>
<td>Variety of Components (e.g., video, discussion board, quizzes) Learning Activities Template</td>
</tr>
<tr>
<td>Authentic Learning</td>
<td>Problem-Based Integration of external tools &amp; apps</td>
</tr>
<tr>
<td>Set clear &amp; high expectations for learners</td>
<td>Learning Objective Wizard Rubric Template Connect to Bloom’s Taxonomy &amp; ABET Student Outcomes</td>
</tr>
</tbody>
</table>
HydroLearn: Constructive alignment with Learning Objectives

Support adopters in developing clear, concise learning objectives

Learning Objectives (Template)

Learning Objectives

At the end of this section, the following is expected:

1. [CONDITION], the student will be able to [ACTION] [TASK] [DEGREE] [LEARNING LEVEL]

ABET outcomes
- [Specify relevant ABET outcomes for these Learning Objectives]
Faculty often struggle with evaluating student work. HydroLearn provides assessment rubrics and guidance.

<table>
<thead>
<tr>
<th>Rubric (Template)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rubric</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Level #1 (Does Not Meet Expectations)</td>
<td>Level #2 (Meets Expectations)</td>
<td>Level #3 (Exceeds Expectations)</td>
</tr>
<tr>
<td><strong>Criterion #1</strong></td>
<td>A detailed description of what criterion #1 would look like completed at level #1</td>
<td>A detailed description of what criterion #1 would look like completed at level #2</td>
<td>A detailed description of what criterion #1 would look like completed at level #3</td>
</tr>
<tr>
<td></td>
<td>1 point</td>
<td>3 points</td>
<td>5 points</td>
</tr>
<tr>
<td><strong>Criterion #2</strong></td>
<td>A detailed description of what criterion #2 would look like completed at level #1</td>
<td>A detailed description of what criterion #2 would look like completed at level #2</td>
<td>A detailed description of what criterion #2 would look like completed at level #3</td>
</tr>
<tr>
<td></td>
<td>1 point</td>
<td>2 points</td>
<td>3 points</td>
</tr>
<tr>
<td><strong>Criterion #3</strong></td>
<td>Assignment does not answer criterion #3</td>
<td>Assignment answers criterion #3.</td>
<td></td>
</tr>
<tr>
<td>(sample dichotomous criterion)</td>
<td>1 point</td>
<td>2 points</td>
<td></td>
</tr>
</tbody>
</table>
Sharing, Collaboration and Customization

Collaboration: Add collaborators to your course

Modularity: Share course elements across different courses

Sharing: Share an entire course with other instructors

Customization: Other instructors can customize your course for their needs

Compatibility: Expose your course content on your own LMS

The platform is not the end goal
## Become a HydroLearn Fellow

Choose to participate at different levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Implement module</th>
<th>Customize module</th>
<th>Create and share</th>
<th>Feedback as a user</th>
<th>Collect student data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>✗</td>
<td></td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Level 2</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Level 3</td>
<td></td>
<td></td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Level 4</td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

Fellows receive a $1,000 - $5,000 stipend depending upon level of involvement.
Come to Our Workshop
Enroll in HydroLearn 101

Self-paced course designed to teach faculty about research behind HydroLearn and how to use HydroLearn - Open enrollment!

Facilitating the development, adaptation and sharing of active-learning resources in hydrology education

Emad Habib, University of Louisiana; Melissa Gallagher, University of Louisiana; David Tarboton, Utah State University; Dan Ames, Brigham Young University

Using HydroLearn, Why and How?

- Introduction
- Section 1: Why adopt HydroLearn
- Section 2: Best Practices in Designing a Module
  - Crafting Learning Objectives
  - Designing Instruction & Assessment
- Section 3: How to Build a Module in HydroLearn
HydroLearn: Sound pedagogical practices

Hydrolearn combines researched-based active learning methods with authentic online learning modules & tools to **scaffold instructors’** implementation of sound pedagogical practices.

<table>
<thead>
<tr>
<th>Pedagogical Practices</th>
<th>HydroLearn Tools to Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Learning</td>
<td>Variety of Components (e.g., video, discussion board, questions,)</td>
</tr>
<tr>
<td></td>
<td>Learning Activities Template</td>
</tr>
<tr>
<td>Authentic Learning</td>
<td>Integration of external tools &amp; apps</td>
</tr>
<tr>
<td>Set clear &amp; high expectations for learners</td>
<td>Learning Objective Wizard</td>
</tr>
<tr>
<td></td>
<td>Rubric Template</td>
</tr>
<tr>
<td></td>
<td>Connect to Bloom’s Taxonomy &amp; ABET Student Outcomes</td>
</tr>
</tbody>
</table>
Why HydroLearn?

We are addressing lack of adoption, scalability and sustainability of educational innovations using a community-centered approach.

**What influence Adoption**
(Rogers 2003)

- Adoption
- Relative Advantage
- Compatibility
- Triability
- Complexity
- Observability
- Community resources
- Learning outcomes
- Assessment rubrics
- Key topics in Hydrology
- Connection with LMS
- Web-based & Open-source tools
- Modularity & customizability
- Scaffolding mechanisms
- Adopter Support
How? Propagation & Transportability Plan

FELLOWSHIP OPPORTUNITY

Develop Interactively

GOAL: IDENTIFY DESIGN PRINCIPLES

Disseminate Interactively

GOAL: CONTINUE TO IMPROVE PRODUCT

Support Adopters

GOAL: IMPROVE SUPPORT MECHANISMS

HydroLearn: Research-based pedagogical practices

Hydrolearn combines research-based active learning methods with authentic online learning modules

- Active Learning Methods
  - Problem-based Learning
  - Collaborative & Cooperative Learning

- Authentic Online Learning
  - Authentic Learning: Real-world Problems, Tools of the Trade
  - Online Learning: Self-Directed, Monitor Progress, Continuous Learning
  - Authentic Online Learning: Embedded real-world problems and tools into online learning
Thank You; Questions

Contact us:
contact@hydrolearn.org
habib@louisiana

Awards: 1726965, 1725989, 1726667