

WATER WORKFORCE WEBINAR SERIES

The Role of Academic Institutions

Office of Wastewater Management

Office of Water

U.S. Environmental Protection Agency

August 24th, 2022

**We will start in a couple minutes.
Thank you.**

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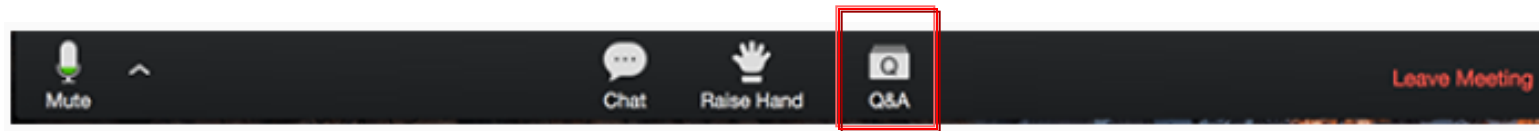
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Webinar Logistics

- This webinar is being recorded
- Participants will be in listen-only mode
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- Webinar slides and recording information will be sent out to all participants following the webinar

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Webinar ID: 160 145 0297

Opening Poll: Please indicate the sector that you work in:

- Utility
- State or Local Government
- Federal Government
- Consultant
- Academia/Educator
- Other

Water Sector Workforce at EPA

- Reminders:
 - Check out our website for resources and updates:
<https://www.epa.gov/sustainable-water-infrastructure/water-sector-workforce>
 - Workforce Initiative
 - Past Workforce Webinars
 - Workforce Case Studies
 - Stay tuned for information on our next webinar. If you are registered for this webinar you are automatically on the email list for future webinars!

August 24th, 2022

The Role of Academic Institutions

Jim Horne, Sustainable Utilities Program Manager, U.S. EPA Office of Wastewater Management

August 24th, 2022

Speakers:



Jessica Brumley, Assistant Professor, East Central University (Oklahoma)



Robin Roberson, Associate Professor and Assessment Coordinator, East Central University (Oklahoma)



Julie Parks, Executive Director of Workforce Training, Grand Rapids Community College (Michigan)

Webinar slides and recording will be sent to registrants within a week after the webinar.



Educational Program on Awareness, Sustainability, and Service in Water/Wastewater (EdPASS-H2O)

Dr. Jessica Brumley – East Central University, Ada, OK

Dr. Robin Roberson – East Central University, Ada, OK

Dr. Keith Strevett – University of Oklahoma, Norman, OK (SME)





Rural Water Association Apprenticeship Programs



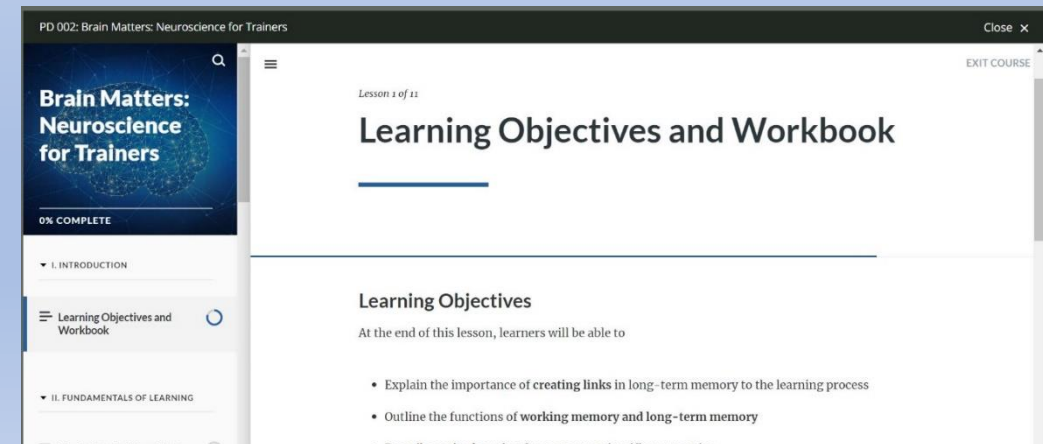
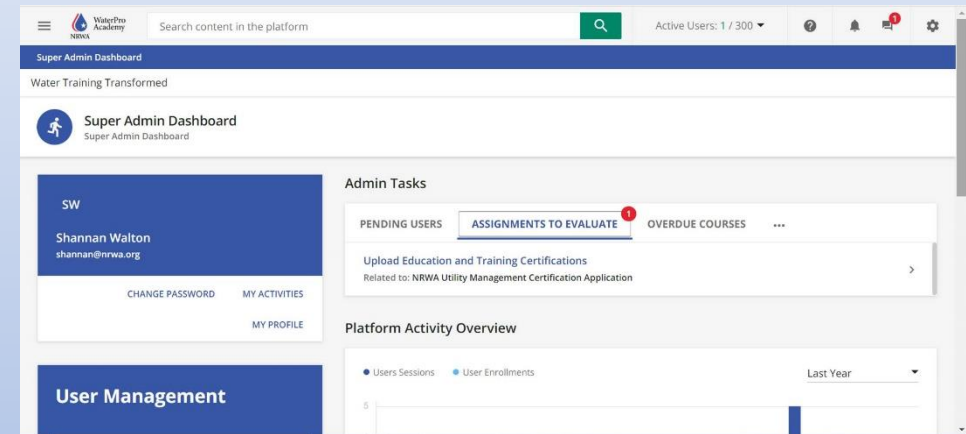
- 90% of the U.S. is serviced by rural or small water municipalities
- Low-cost two-year training programs through State Rural Water Associations
- Earn while you learn



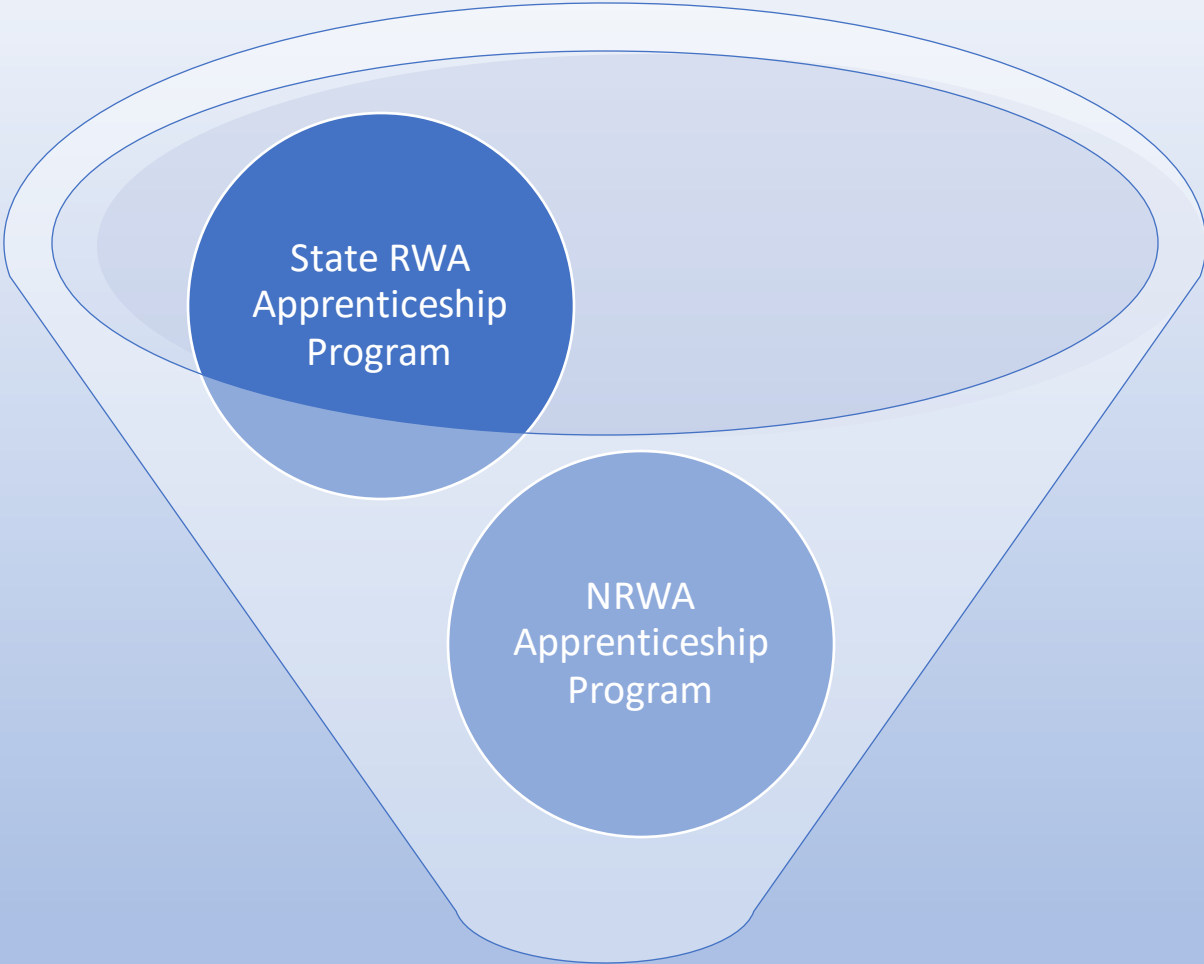
NRWA WaterPro Academy



- Learning management system (LMS)
- Provides digital infrastructure to track different programs
- Links with the NRWA Apprenticeship Tracking system
 - Pre-Apprenticeship records will transfer



The missing ingredient



Water/Wastewater Industry Careers

EdPASS-H2O Project Description and Goals

EdPASS-H2O is a K12 STEM-based curriculum framework that provides students with foundational knowledge and awareness of water/wastewater issues and related career opportunities/pathways.

ECU/OU are partnering with NRWA to provide authentic learning experiences for K12 students in an effort to achieve the following:

- Goal 1: Produce the next generation of water consumers who understand how water cycles through both natural systems and human-made systems
- Goal 2: Produce the next generation of water consumers who are aware of and actively work to alleviate current and future water issues
- Goal 3: Produce the next generation of water/wastewater infrastructure professionals capable of handling open-ended technical projects that require creativity, self-analysis, and awareness of economic and social issues
 - Enroll local high school students in their EdPASS-H2O Certificate Program (a pre-apprenticeship program)
 - Produce EdPASS-H2O Certified high school graduates who qualify for the National Rural Water Association Apprenticeship Program

Partner Responsibilities

ECU and OU

- EdPASS H2O pre-apprenticeship *curriculum framework*
- EdPASS-H2O supplemental cross-curricular *modules* (P/PBL) aligned w/national standards (math, science, ELA, financial literacy)
- EdPASS-H2O *simulation app* for use with modules and stand-alone
- School Counselor kit
- Surveys
- Provide set-up at local schools



NRWA/State RWA

- Subject Matter Experts
- Provide speakers/personnel for local educational or career development events
- Provide digital Learning Management System (NRWA)
- Track EdPASS-H2O graduates applying to formal apprenticeship program through State RWA/NRWA portals (NRWA)
- Holder of MoU with school districts (state)
- Provide information on local/state water/STEM-focused K12 activities (state)
- Use LMS to track HS student progress and award certificate of completion upon graduation and fulfillment of EdPASS requirements (state)



Focused Efforts on Working Relationships

*The majority of EdPASS H2O is set in K12 schools but for it to work well, **the relationship with local water/wastewater districts, municipalities, and tribes is extremely important***

Rather than attempt to put an EdPASS program in every school in the state, it will be more efficient/effective and successful if we focus our efforts

- Select 10-20 water/wastewater districts, municipalities, and tribes to work with in the state
- Approach school districts around those sites with the EdPASS H2O program

K12 Timeline: In addition to regular STEM curriculum in these grades...

4th - 6th grade

7th - 8/9th grade

9/10th - 12th grade

Introduce students to water and water/ wastewater industry through

- Local STEM fieldtrips
- Invited speakers from State RWAs

Introduce students to water and water/wastewater industry through

- P/pBL modules
- Career curriculum and field trips
- Local STEM fieldtrips
- Invited speakers from State RWAs

Introduce students to water and water/wastewater industry through

- EdPASS H2O Pre-Apprenticeship
- P/pBL modules
- Career curriculum and field trips
- Local STEM fieldtrips
- Invited speakers from State RWAs

EdPASS Pre-Apprenticeship *Curriculum Framework*: High School

Careers Available in Water and Wastewater	Min Educ Level	HS Math	HS Sciences	Other HS Courses and/or Experiences
	Required	Required	Required	<i>Highly Advised</i>
Water Systems Specialist <ul style="list-style-type: none"> Municipal water treatment plant operator Rural water operator Both handle infrastructure and water treatment 	Water: HS Diploma or GED	State minimum math coursework for HS graduation Water: min overall math GPA 2.75	State minimum science coursework for HS graduation *If not required in state min, also require (if offered): <ul style="list-style-type: none"> Env or Earth Sci Physical Sci Computer Sci/Digital Tech Water: min overall science GPA 3.0	<ul style="list-style-type: none"> EdPASS P/pBPL Modules Vocational Agriculture: <ul style="list-style-type: none"> Ag Science Ag Business Ag Comm Ag Mechanics Env Sci Mech Systems Power/Tech CPR/First Aid Bookkeeping or Accounting Business or Marketing STEM clubs or activities <ul style="list-style-type: none"> GPS data collection GIS mapping Drones Robotics Programming For supplemental coursework assigned a letter grade, min overall GPA 2.75
Wastewater Systems Specialist <ul style="list-style-type: none"> Wastewater treatment plant operator Requires more math/sci knowledge since working with biologics	Wastewater: HS Diploma or GED required – A 2- or 4-year degree is recommended as it should be helpful w/licensure	Wastewater: min overall math GPA 3.0	Wastewater: min overall science GPA 3.25 <ul style="list-style-type: none"> Chemistry strongly suggested but not required 	

EdPASS-H2O Problem/Project-Based Learning Modules

Introduction to Problem- and Project-Based Learning (P/pBL)

How Learning Occurs Tutorial

Basic lesson planning format for P/pBL

P/pBL Modules

- Modules based on authentic water and wastewater industry scenarios
- Basic content provided
- The following also will be identified:
 - Science, Math, ELA, Financial Literacy Content National Academic Standards
 - Learning Goal(s) and Measurable Learning Objectives
 - Outcomes Assessment/Deliverables
 - Resources

Glossary of industry terms and acronyms

Modules and Scenario Topics

- Water Cycle
- Human Water Cycle
- Drinking Water Treatment
- Wastewater Treatment
- Math Conversions/Dosage
- Pipe Flow
- Careers in Water/Wastewater



EdPASS-H2O Problem/Project-Based Learning (P/pBL) Modules

Scenario 1 Decentralized Septic System

- **Problem 1:** You've turned on the faucet at the sink and only a dribble of water comes out.
- **Problem 2:** Smelly water from the septic tank is backing up into the drain in the laundry room floor.
- **Problem 3:** A stinky wet spot has developed in the yard between the house and the septic tank.

Scenario 2 Centralized Sewer Systems

- **Problem 1:** We are in a drought and the volume of water from the local drinking water source (shallow groundwater wells) is decreasing at such a rate that our town's current level of consumption cannot be maintained for much more than a month.
- **Problem 2:** A drought-buster storm system came through and dumped 10 inches of rain on our town over the course of two days.
- **Problem 3:** At the wastewater treatment facility, a part on one of the pumps has broken and the pump is now offline; the part is backordered for 6 months due to supply line issues.

EdPASS-H2O Problem/Project-Based Learning (P/pBL) Modules

Problem Solving: Base your responses to the problem on what you have learned about about the natural water cycle, the human water cycle, and any other resources to which your teacher has given you access.

1. Clarify the problem
2. Predict what may occur if the problem is not addressed
3. Predict the source(s) of this problem
4. Choose one of the sources to investigate
5. Identify and gather credible information to solve the problem
6. Analyze the information by comparing and contrasting alternate solutions based on several different variables
7. Evaluate the potential solutions to determine the best means to address the problem:
 - *immediately* and
 - create a solution to fix the problem for the long term
 - may include cost/benefit analysis
8. If we can, how do we prevent this problem from occurring again?



Student Motivation and P/pBL

Problem/project-Based Learning = Inquiry-Based Learning

Inquiry: Questions instead of answers

- Curiosity

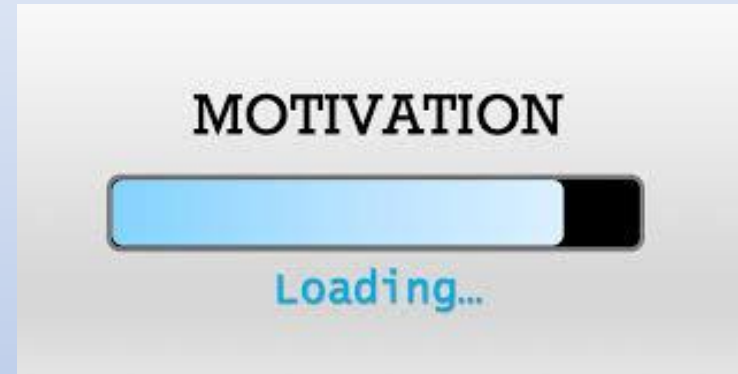
Authentic: Real-world learning

- Relevance
- Utility value
- Answers the “Why” and “When will we ever” questions

Autonomy: Independent learning

- Self-directed

Group Learning: Teamwork



Intrinsic Motivation

EdPASS Pre-Apprenticeship *Curriculum Framework*: Skills/Experiences

Careers Available in	HS Skills Support	Job Shadowing	Licensure or Certificate	EdPASS Simulation App
Water and Wastewater	Required	Required*	Required	Required
Water Systems Specialist <ul style="list-style-type: none"> Municipal water treatment plant operator Rural water operator Both handle infrastructure and water treatment 	Academic: <ul style="list-style-type: none"> reading for meaning basic math skills technical writing studying test-taking critical thinking problem solving Career: <ul style="list-style-type: none"> resumes interviewing interpersonal comm (verbal, written, incl. email, telephone) cooperative work public relations/customer service 	Jr Year: 30+ hours Sr Year: 60+ hours Time spent in field with Water Operator observing major aspects of profession *Field log (what, where, when), plus digital reflection after each ride-along * Prior completion of work in EdPASS App *Student likely required to have liability insurance *#Operator required to have background check ^Recommended student has prior CPR/First Aid training	YES – for both Water and Wastewater <ul style="list-style-type: none"> Multiple levels of licensure Test for each level Levels recognize increased knowledge and skill Consider the following: GPS training GIS certificate Heavy equipment training CDL: Class D driver’s license (must be 18 y/o)	Completion of leveled scenarios in app prior to job shadowing each year Jr Year: must complete Internship level scenarios and Apprenticeship level scenarios Sr Year: must complete Manager level scenarios
Wastewater Systems Specialist <ul style="list-style-type: none"> Wastewater treatment plant operator Requires more math/sci knowledge since working with biologics				

EdPASS H2O: Water Industry Learning Simulations

Simulations commonly used for learning complex skills

- Flight simulations
- Surgical simulations
- Driving simulations
- Builds confidence
- Immediate feedback
- Allows repeated practice
- Accessibility
- Mistakes are valuable learning opportunities



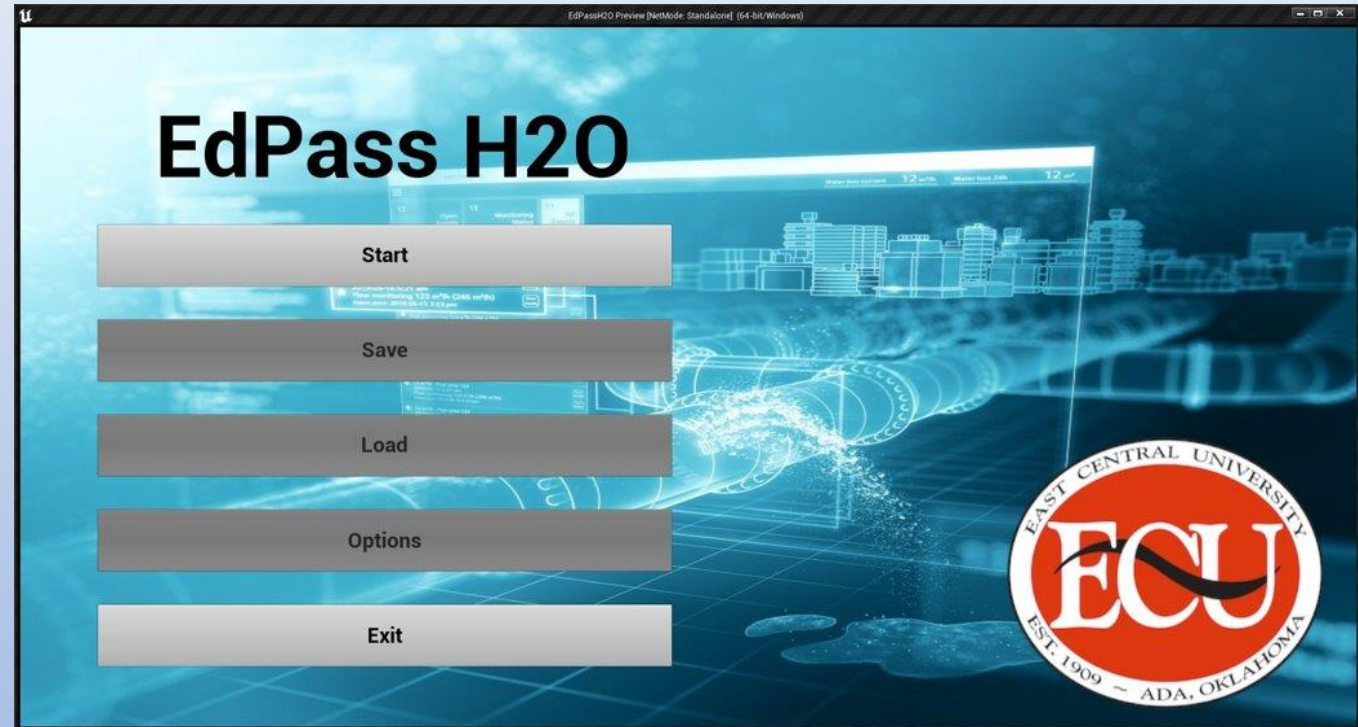
Simulation Inspiration – Labster and Minecraft Education

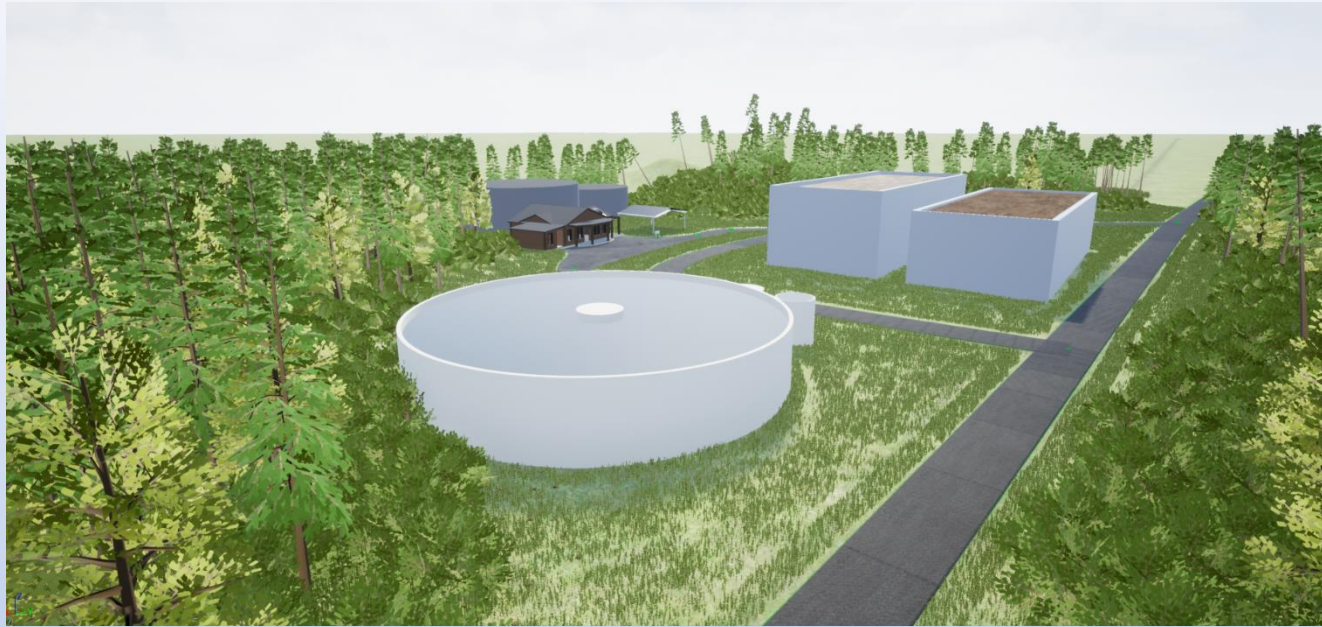
- The pandemic fostered much educational simulation development
- Labster
 - Successfully used in the sciences for lab prep and practice for distance education
- Minecraft Education
 - Free to Microsoft subscribed schools



EdPASS H2O Simulation

- Interactive game environment used to simulate practice in Water Industry
- Students explore various water related environments
 - Water Operations Office
 - Wastewater Treatment Plant
 - Drinking Water Treatment
 - Pipes
 - Decentralized Water Treatments
 - Surface Water Locations





Multiple Locations

**Progressively
difficult
problems and
solutions**



Simulation Credits: William Northcutt, John Elliot, Tristan Wood

EdPASS H2O Simulation

Treatment Systems Scenarios

Identify Failing Unit Ops

Replace Pipes Near Unit Ops

Increase and Decrease Treatment Times

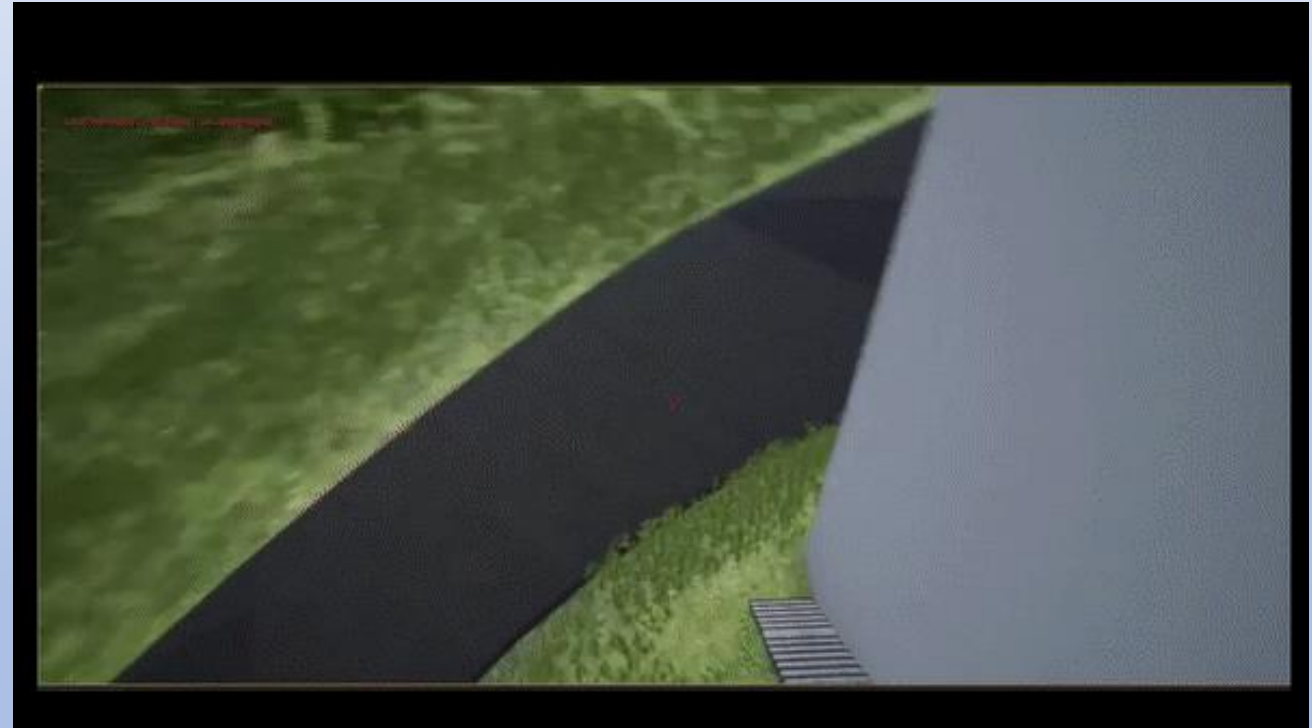
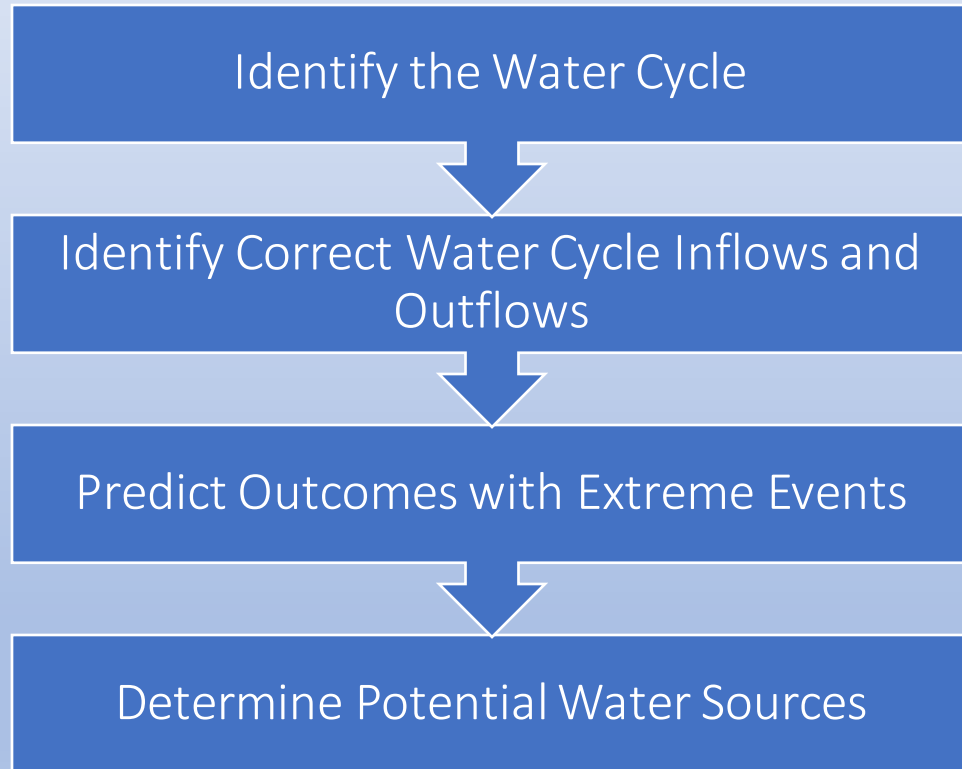
Determine Dosage



Simulation Credits: William Northcutt, John Elliot, Tristan Wood

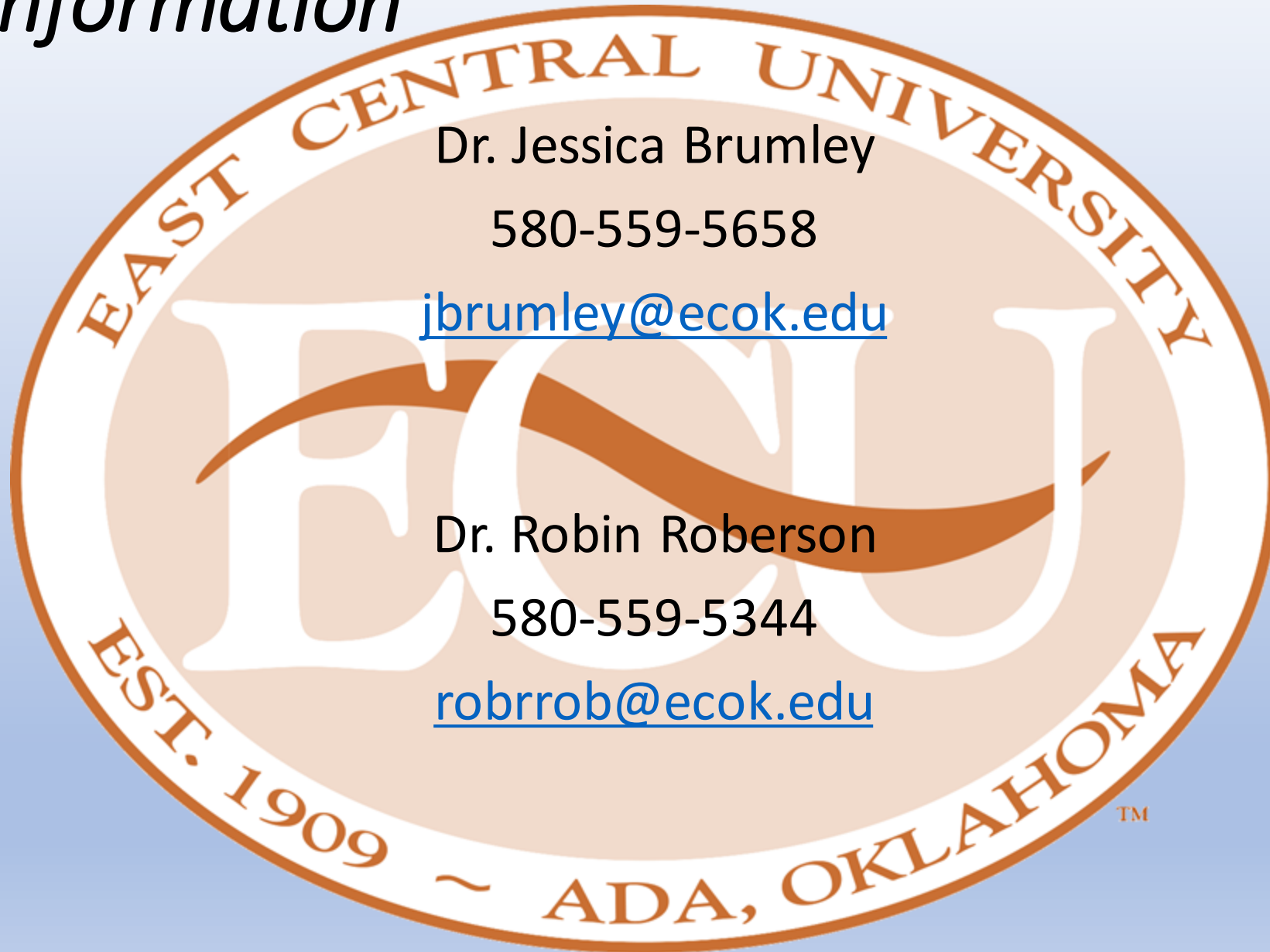
EdPASS H2O Simulation

Water Cycle Scenario



Simulation Credits: William Northcutt, John Elliot, Tristan Wood

Contact Information



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West Michigan Water Career Program – Water Infrastructure Workforce Development

Grand Rapids Community College
City of Grand Rapids, Michigan, Public Works
Bay College



Julie Parks, Dean, Workforce Training & Interim Dean
Business & Industry – Grand Rapids Community
College, Michigan

GRCC



Partnership to create the water workforce pipeline and fill it with highly qualified people.

- Started with a Public Works Academy
- City of Grand Rapids' goal to upskill and hire individuals for job openings in the water plants.
- Stop being the “best kept secret” and explain why water workers matter.

Partnering and not recreating what already exists:

- Bay College's strong Water Technology Program.
- City water staff as instructors.
- Grand Rapids Public Schools
- Grand Rapids Urban League
- West Michigan Hispanic Center
- LINC UP
- Neighborhood organizations.
- Downtown Development Authority



Restoring the Rapids - - River for All



Expand public knowledge of the importance of water services.

Increase awareness of family sustaining job opportunities in water and wastewater sectors.

How:

- Convene industry & workforce development collaborations and partnerships.
- Building public awareness through community outreach.
- Piloting career focused programming for middle & high school students.
- Expanding postsecondary training options using career pathways and coordinated candidate development system to assist with retention.
- Feedback process to evaluate effectiveness and scalability.



Strategy to Increase Public Awareness

- Trades in the Parks (1st one in held in June)
- Water Weekends (start in October)
- Neighborhood Group visits
- Community based non-profit engagement.
- News articles, social media, project website
- Youth organizations (Boy Scouts, Camp Fire Girls, Boys & Girls Clubs, robotics teams)

Youth Career Education Programming



- Middle School (5th-8th grade)
- High School (9th-12th grade)

Integration with Michigan Science & Social Studies Standards.

Summer Camps

Career Development Opportunities (job shadows, GROW1000 program, etc.)

Mentoring

Postsecondary & Adult Training



- Water Certification Workshops
- Waste Water Certification
- Water Technology Associates Degree with Bay College, delivered virtually (classroom), labs through City of Grand Rapids.
- Internship Program with City of Grand Rapids.
- Apprenticeships (Earn & Learn model)
- Support Structure – Community based partners, mentors from the City of Grand Rapids.
- Support dollars from workforce partner (West Michigan Works!)



West Michigan Works! Local Workforce Board Partner

- Support in recruitment activities.
- Workforce Innovation Opportunity Act (WIOA), TANF, PATH, Apprenticeship, etc. – Funding opportunities.
- Support services for participants.
- Talent Tours for youth and adults.
- Youth programming.
- Apprenticeship Standards.

Upskilling city employees



- Certified through Bay College Program
- Specialized certifications (i.e., Green Infrastructure certification)
- Career pathways to other associate degrees and bachelor degrees

Liliana Saldana wasn't sure what she wanted to do.

“After high school, I didn't head right to college. I was indecisive about what I wanted to do.”



A family member suggested that she look into the Grand Rapids Community College Public Works Academy.

“They thought it would be a great way for me to explore different types of work and it really was.”

GRCC and area municipalities partnered to create the academy. Public works employees are vitally important in our communities, and in great demand across West Michigan.

“The Public Works Academy was a real eye-opener for me. It was interesting learning about what a city has to do support its citizens,” Saldana said. “There is so much! I liked that so much of it was learning hands-on skills. I also didn't realize all the rules and safety protocols necessary to know.”

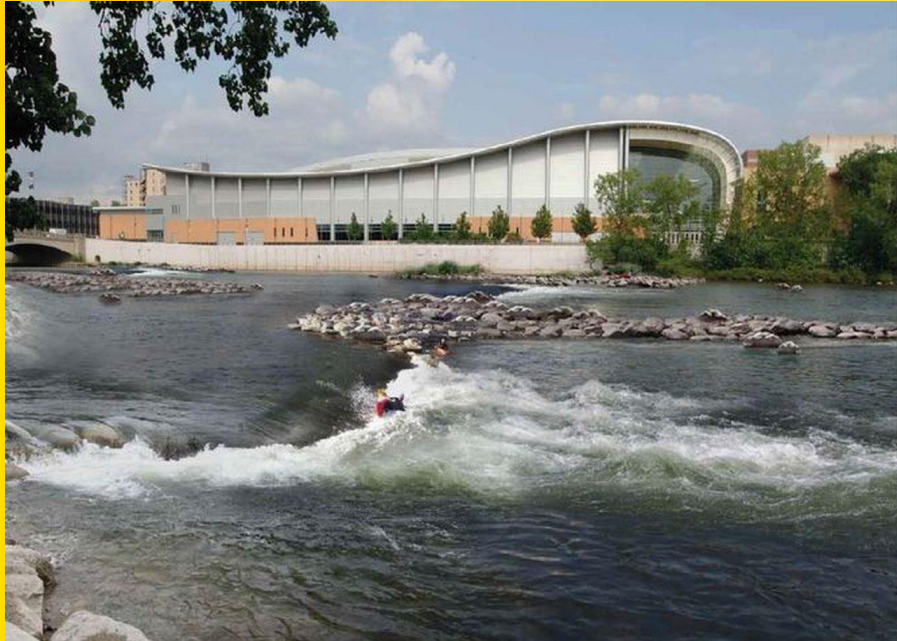
Saldana credits the Public Works Academy for her opportunity to work for the City of Grand Rapids.

Outcomes



- Program Details (curriculum & planning) to disseminate for: Water weekends, middle school camps, middle school active learning activities, water services workshop for adults.
- Increase the number of individuals from low socio-economic and/or areas of high unemployment into water sector jobs.
- Increase diversity of the candidate pool by 3% by the end of year 3.
- Have a minimum of 10 certified instructors in WET curriculum and GRCC curriculum.

Outcomes



- Visual representations of west Michigan water career pathways and options including stackable credentials.
- Develop and pilot City of Grand Rapids water internship and/or apprenticeship program.
- Increase skillsets of incumbent workers in water utilities
- Create a recruitment tool kit that can be used to ensure diverse and equitable candidates enter into education programs and get employed.

Timeline - 1



Timeline – Continued.

Media
Campaign
(October-
November 2022)

Water
Weekends
(November
2022)

Visual Career
Pathways
(March 2023)

Elementary
School
Outreach (300
students)
Fall 2023

2nd Round of
interns/
apprentices
August 2023

Questions and Comments

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Hillary Caron, Chemist, City of Grand Rapids Water System,
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Q&A Session

Webinar slides and recording will be sent to registrants in the next week.



Closing Poll

On a scale of 1-10, with 10 being the best score and 1 being the worst, how would you rate today's webinar?

If you do not see a poll window pop up, please use the **Chat function** to type in your answer.

Thank you!

