

## WaterWorks: Engineering and Investigating the Properties of Water

### GRADE LEVELS:

PreK – 2

### EDUCATIONAL SETTING:

In school / out of school

### Award Provides:

- A WaterWorks Classroom Kit with materials to investigate the properties of water and a water wall to engineer the movement of water. The kit includes
- a large tub with a pegboard water wall
- cups that have one of 3 different sized holes (large, medium, small) drilled into one of 4 different positions (side top, side middle, side bottom, and bottom)
- hooks to hold a cup that can be positioned in different locations on the water wall
- a reservoir to hold water at the top of the water wall
- misters and plexiglass sheets with stands to investigate behavior of water droplets
- different sizes of plastic tubing
- child-sized hand water pumps, funnels, plastic syringes, pegboard baskets, plastic test tubes
- materials to build water wheels
- a large variety of transparent or translucent bottles or measuring containers, a rubber-backed carpeted mat to protect the floor from spills
- sponges, terry cloth towels, bucket

### 2023-2024 STEM Scale-Up Program Summary:

WaterWorks is an Iowa grown early childhood STEM experience that is receiving national attention because it immerses children in *doing* STEM every day. At the same time WaterWorks experiences create a desire within children to master the tools of reading, writing and mathematics to communicate about their STEM learning. WaterWorks was developed through partnerships among Iowa researchers in child development and curriculum, Iowa teachers and Iowa children, to support PK-2 teachers in developing a framework that capitalizes on the reciprocal relationship of STEM and literacy learning. Within this framework, daily independent STEM investigations occur alongside the daily independent literacy investigations that many teachers have already established in preschool through grade 2 classrooms. Many PreK-2 educators who are implementing this framework tell us integrative STEM and literacy has brought them joy in teaching and learning.



For STEM to be meaningful to young learners, four things must be in place:

- 1) children must be able to produce an action by themselves
- 2) the result of their action must be immediate
- 3) the result of their action must be observable
- 4) there must be something for children to vary

Investigating Water fits these criteria well. For example, children can produce an action to move water with an immediate result, observe it and then vary the spatial configuration of containers to enhance the design of their system to move water.

The open-ended experiences within WaterWorks capitalize on children's natural interest in water and grows their skill in close observation. Moving liquids is very different from moving solids.

Observing raindrops on a window pane leads children to a working understanding of water's properties of cohesion and adhesion.

### Requirements to Implement the Program:

- 1.) Educator(s) must attend 2 six-hour days of highly interactive professional development (one before the start of the school year when the educator receives the classroom kit, one in the fall after implementation begins)
- 2.) A minimum of 3 hours of online interaction with peers and instructor throughout the fall.
- 3.) Educator(s) must participate in the STEM Council Scale-Up Educator Survey.

- Book: *Investigating Water with Young Children* (Part of our *STEM for Our Youngest Learners Series*) to guide implementation and alignment with standards
- High quality and engaging professional learning taught by degreed early childhood master teachers with classroom experience
- Ongoing support through a private social media platform
- One UNI graduate or undergraduate credit (based on educator's needs)
- \$240 Participant Payment when educators attend both face-to-face sessions

**Additional Cost(s) to Awardee in 2023-2024:** No additional costs necessary

**Approximate Sustainability Cost After Award Period:**  
Materials will last for years with typical classroom use

**Website:**  
<https://regentsctr.uni.edu>

**Videos:**  
<https://animoto.com/play/tmCBNKuokjcfAMyIphHD3jQ>

**Social Media:**  
[facebook.com/RegentsCenterUNI](https://www.facebook.com/RegentsCenterUNI)

**Informational Sessions (15 min.)** Register for:  
[Thurs., Jan 19 @ 3:30](#)  
[Friday, Jan 20 @ 3:30](#)

or visit  
<https://regentsctr.uni.edu/>  
to watch an introductory video

**Iowa Standards Alignment:**

WaterWorks offers experiences that are meaningful to young children and applicable to many of the K-2 Next Generation Science Standards (K-PS2; K-ESS2&3; 1-LS1; 2-PS1; 2-LS2; 2-ESS1; and K-2-ETS1).

WaterWorks experiences are applicable to many of the **Iowa Early Learning Standards** and **K-2 Next Generation Science Standards**. and are highlighted in professional learning. Water plays a large role in an ecosystem, and how earth is shaped. The repelling, collection, and movement of water are contexts rich for meaningful engagement in engineering design. In the act of construction to collect and move water, students engage in the **mathematics** of spatial thinking, geometry, measurement, and collecting and analyzing data. Iowa Core **Literacy Standards of Language, Speaking and Listening, and Writing** are addressed as children participate in conversations about water and its movement. They recount their construction experiences with appropriate facts and relevant descriptive details. They encounter unknown and multiple-meanings of words and phrases as they seek to explain and engage in scientific argumentation. Finally, in WaterWorks, students develop **21st Century Skills** such as creativity and innovation when they have new and worthwhile ideas to collect and move water. Civic Literacy is experienced as they co-create rules and management systems for working within experiences involving water.

**Professional Development:**



Awardees will experience two six-hour sessions of research-based active and hands-on high-quality professional learning that will earn them one UNI graduate or undergraduate credit upon completion. All WaterWorks Instructors are either active or veteran early childhood educators with advanced degrees. In the professional learning sessions, educators will be exploring water and its properties using the same materials they will offer their children in the classroom. The first session will occur on a weekday in July or August. At the end of the first session, each educator will be given their classroom kit to take home with them. Educators will sign up to a private social media platform to stay connected with their peers and Instructor throughout the fall. Educators post photos and videos of their children in action, or seek advice in problem solving. Many educators tell us this networking is one of their favorite parts of their professional learning.

The second session will take place on a Saturday in October or November after educators have had an opportunity to experience WaterWorks with their children. Educators bring with them stories of difficulties and successes and often questions and ideas they have raised in their own understanding of water and its movement. Awardees will once again investigate water with materials but with an added focus on how to document children's learning, and integrate STEM learning with literacy learning. STEM learning does not distract literacy learning, it enhances it.

**Duration:** Dress for comfort for a fun-filled day of learning with peers for 2 six-hour days (first session on a week day in July/August, second session on a Saturday in October/November) plus regular communication with peers and the Instructor through private social media.



**Location:** In your STEM Hub area at a place to be determined

**STEM Scale-Up Program Application Link:** [www.iowaSTEM.org/Scale-Up-Application](http://www.iowaSTEM.org/Scale-Up-Application)