



PUBLISHER'S BACKGROUND INFORMATION

January 2020

Activate Learning is dedicated to promoting science literacy and achievement through three essential principles:

- Engage students with authentic learning and phenomena that are relevant and meaningful.
- Inspire teachers with research-based curricula that support three-dimensional learning.
- Prepare students for STEM careers of tomorrow.

Designed for the Next Generation Science Standards

IQWST[®] (Investigating and Questioning our World through Science and Technology) was developed through grant funding from the National Science Foundation. The development team, with combined expertise in science education, literacy education, and the learning sciences was led by Principal Investigators Joe Krajcik, Ph.D. (Michigan State University), Brian Reiser, Ph.D. (Northwestern University), LeeAnn Sutherland, Ph.D. (University of Michigan), and David Fortus, Ph.D. (Weizmann Institute of Science). At IQWST's foundation is research on how students learn and how they learn science in particular, the very research on which *A Framework for K–12 Science Education* and the Next Generation Science Standards are also based.

As research indicates, and as the *Framework* and the NGSS describe, students learn best when they use coherent materials that support them in building understanding over time.

IQWST[®] **Integrated Edition** engages students in scientific practices as they experience, investigate, model, and explain phenomena while learning core ideas and engaging with crosscutting concepts. Students build understanding by connecting ideas from lesson to lesson, from module to module, and across grades. Students also pursue their own original questions in modules that integrate the fundamentals of Physics, Chemistry, Life, Earth and Space Sciences, and Engineering.

The Core Tenets of the IQWST curriculum are:

Three-dimensional: Every learning sequence engages students with all three dimensions of the Next Generation Science Standards. For teacher planning purposes, Performance Expectations are identified at the beginning of each IQWST lesson, and all three components of three-dimensional learning are identified at the beginning of each activity.

1. **Disciplinary Core Ideas (DCI)** are typically addressed in multiple lessons, with the aim of developing depth of understanding rather than simply achieving coverage.
2. **Scientific and Engineering Practices (SEP)** engage students meaningfully in the work of scientists as they explore and learn core ideas.
3. **Crosscutting Concepts (CCC)** thread throughout the curriculum so that students construct deep understanding of the ideas as they apply to each science discipline.

Phenomena-driven: Students experience phenomena firsthand where possible, secondhand where not possible, but always so that the goal of science learning is to be able to explain phenomena—to explain *how* and *why* things in the natural world happen as they do.

Coherent: Students build understanding through a progression within each grade and across grade levels, learning critical DCIs, CCCs, and SEPs across content areas. Curricular coherence—revising and building on ideas across time—provides students with opportunities to develop, reinforce, and apply their understandings on an ongoing basis.

Student-centered: Students’ original questions are at the core of the curriculum, elicited by an anchoring phenomenon, setting them on a quest to find answers that motivate learning across time.

Discourse-centered: Combining small-group and whole-group discussion in every lesson, supported by tools including a Driving Question Board and a Word Wall, students have multiple opportunities to use the language of science. Talk is used to share ideas, to think together, to problem solve, and to make sense of in-class science, everyday experiences, and the larger world.

For all: IQWST engages *all* students with shared phenomena, common investigations, and opportunities to connect their everyday life experiences with science content. As students read, write, and talk about their experiences in a language-rich environment, every student has an opportunity to achieve success.

Joe Krajcik, Ph.D., a developer of the NRC Framework, NGSS, and IQWST, presents around the country on what makes teaching with three-dimensional learning different. Joe states: *“Perhaps the most significant shift in the Framework for K-12 Science Education and NGSS is the students need to make the sense of phenomena or design solutions for problems by scientific and engineering practices, disciplinary core ideas, and crosscutting concepts working together. The working together of the three dimensions to make sense of phenomena and design solutions to problems is referred to as three-dimensional learning. Making sense of phenomena and designing solutions drives the teaching and learning process. ... The Framework and NGSS, based upon the research literature, clearly point out that you cannot learn scientific content (core ideas and crosscutting concepts) separate from engaging in practice. We learn content by engaging in practices and we learn practice by using science content to make sense of phenomena or design solutions to problems.”*

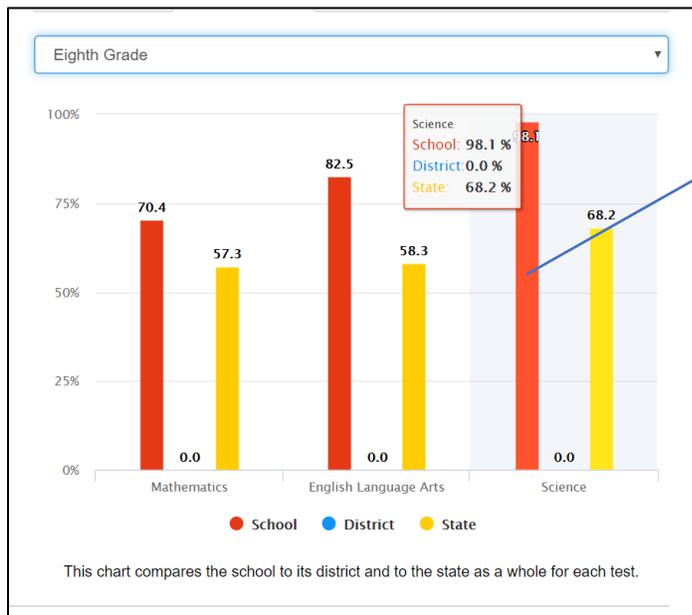
Evidence of Efficacy

Students using IQWST in middle school classrooms across the country have demonstrated growth and excellence in standardized tests. Here are a few examples:

2018 8th Grade State Science Assessment STEM School, OH

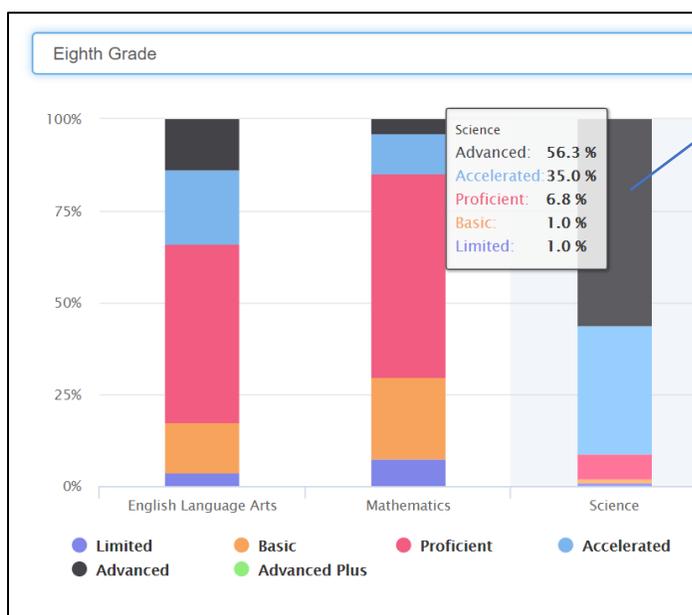
Implemented IQWST in 2010-2011

Source: Ohio Department of Education, [Ohio School Report Card](#)



98.1% of IQWST students passed the 8th Grade Science Assessment

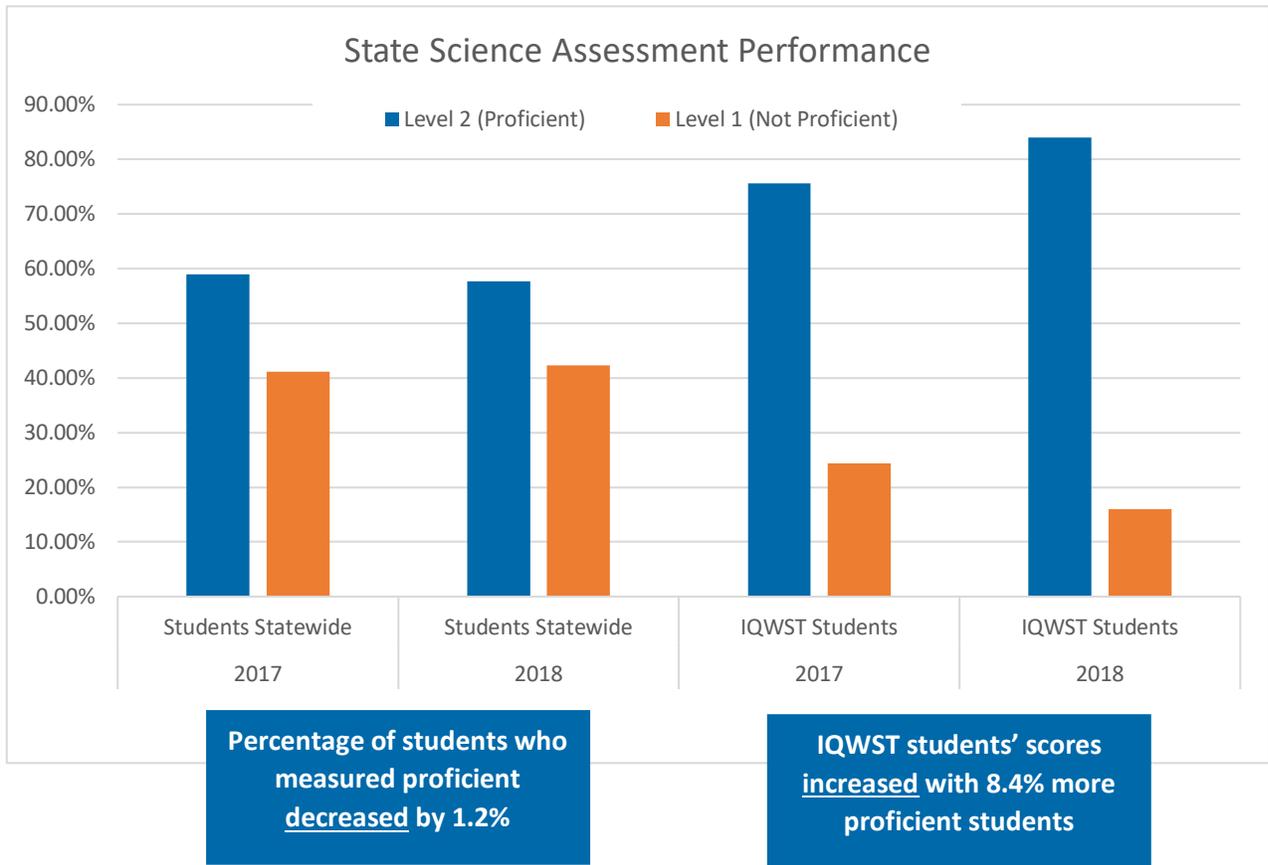
Almost 30% higher than the state average



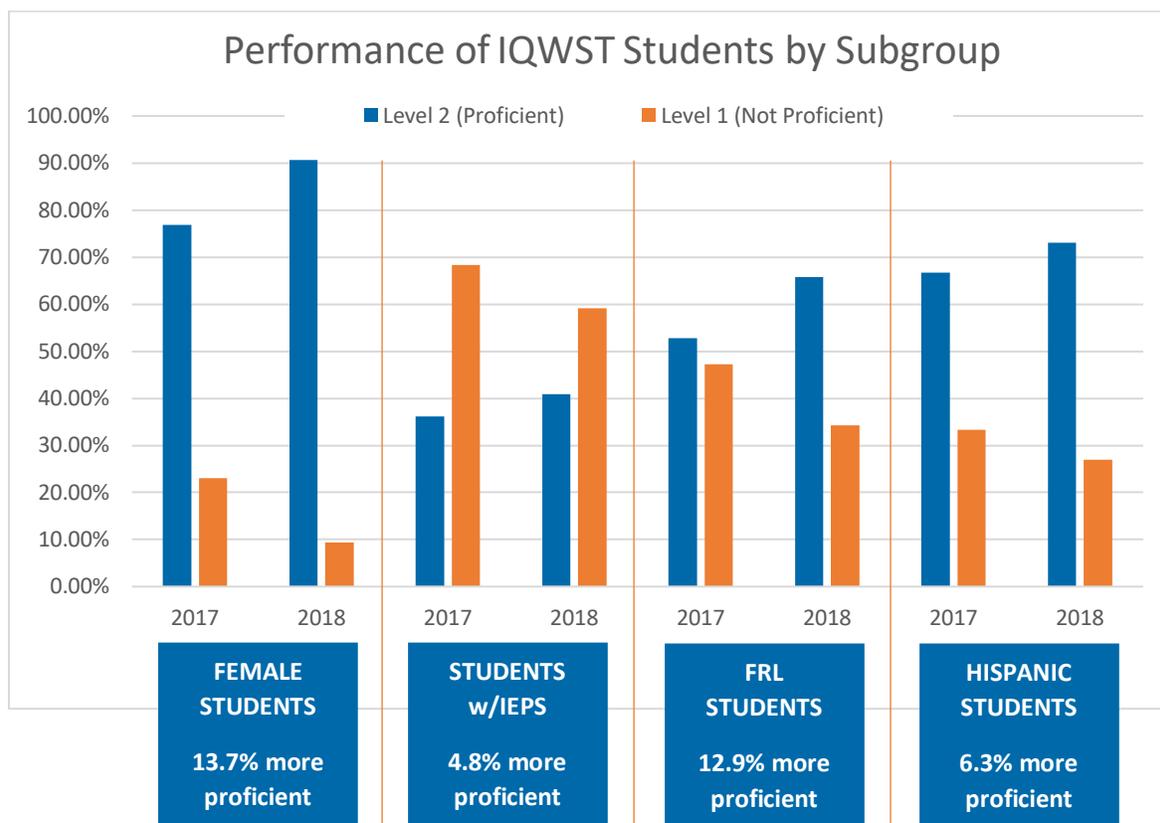
Over 90% of IQWST students passed with Advanced or Accelerated scores (>80%)

2018 Student Growth Suburban Midwest District

Middle school science teachers taught IQWST in 2017 and 2018. While average performance of 8th graders on the state science assessment *decreased* slightly, scores for IQWST students *increased* during the same period.



Disaggregated data of the same district shows improved performance of IQWST students by population subgroup.



District Profile: 15% FRL, White 62%, Hispanic 31%, Black 3%, and the remaining 4% of the student population identifies as either Asian, American Indian, Pacific Islander, or a combination of two or more races.

2019 Science Pilot

Large Northwest School District

This district's middle schools piloted 3 science programs. Students were given pre- and post-assessments scored on a scale of 1 (Developing) to 4 (Highly Proficient). Students in the IQWST pilot showed the largest growth with an average of 1.27 points higher on the post-test.

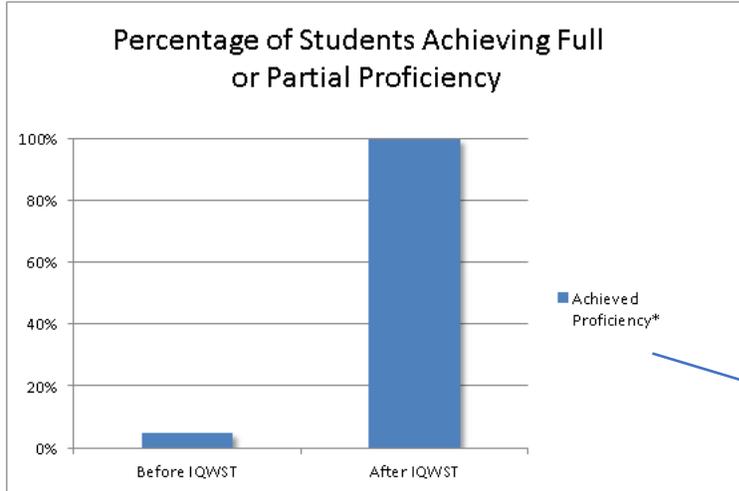
| | IQWST (395 students) | Curriculum B (328 students) | Curriculum C (486 students) |
|--|--------------------------------|---------------------------------------|---------------------------------------|
| Average Change to Scores from Pre- to Post-assessment | 1.27 | 1.09 | .92 |

Anecdotally, 70% of students in the IQWST pilot voted to adopt IQWST compared to 48% and 59% for Curricula B and C, respectively.

Student Growth Data on IQWST Unit (PS2: Energy)

Middle School, OR

Students from 2 classes demonstrated growth in proficiency throughout the course of the unit as demonstrated by Pre- and Post-assessment data. *



*73% of students are at or above a proficient level.

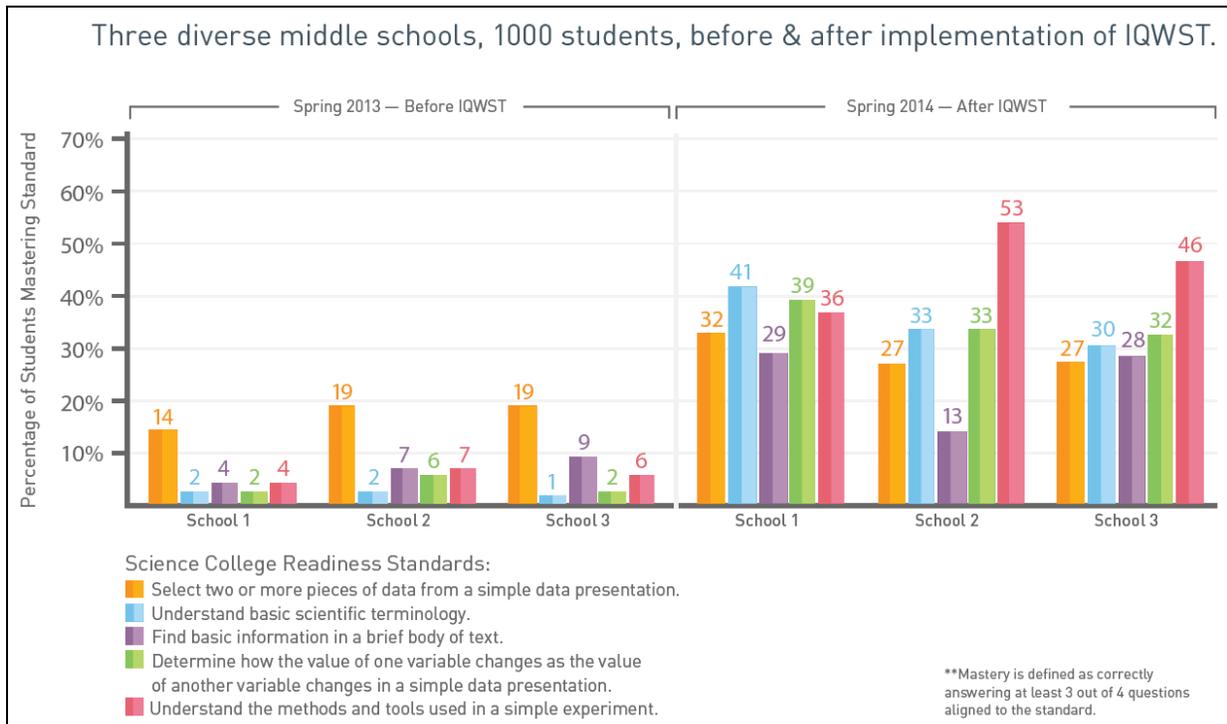
*27% are partially proficient at grade level.

*After the unit, 0% are below proficient at grade level.

| | Below Proficient | Partially Proficient | Proficient | Advanced |
|-------|------------------|----------------------|------------|----------|
| Score | 1 | 2 | 3 | 4 |
| Pre | 95% | 5% | 0% | 0% |
| Post | 0% | 31% | 55% | 14% |

100% of IQWST students demonstrated growth

College Readiness Results After IQWST Implementation



Supplemental Services to Support Implementation

PROFESSIONAL LEARNING

The goal of Professional Learning for teachers is, of course, improved student learning! Research indicates that to improve student outcomes, Professional Learning must enable teachers to experience the curriculum firsthand, which is why in-person PD is always our priority.

In-school Professional Development

Our dedicated Professional Learning team works with districts to develop and execute successful implementation plans. Our consultants are award-winning educators who have taught the curriculum. Sessions engage teachers in a series of activities, focusing on how the instructional sequence uniquely supports students in building and applying science ideas, practices, and concepts over time.

Beyond face-to-face opportunities, we also offer virtual support options:

- ✓ Supplementary Support Webinar
- ✓ Q&A with a Curriculum Expert
- ✓ IQWST Teacher Portal Support Site
- ✓ IQWST Facebook Group
- ✓ Lesson and Materials Setup Videos

STORYLINES

Part of the intellectual richness and rigor of IQWST is the challenge it provides as students connect ideas across modules. IQWST's storyline approach uses a Driving Question as the project or problem around which each module is built. That is, students build understanding of DCIs, CCCs, and SEPs in a coherent manner from one lesson to the next, with each activity raising a new question or a not-yet-solved problem that is addressed in the following activity. Hence, from a student perspective, a story is built from activity-to-activity, and lesson-to-lesson within each module, with the aim of answering the Driving Question in a complete, evidence-based explanation. In addition, the curriculum is designed such that each module connects to the one before it, providing a yearlong storyline to support student sense making across the entire school year. For teachers, the Storyline for each unit provides a detailed synopsis of each activity, serving as a both guideline and outline to support teachers in planning for and assessing learning.

DIFFERENTIATED INSTRUCTION

IQWST provides teachers with instructional supports and strategies to accommodate gifted and struggling students. These include:

- ✓ Research-based general strategies described in the *IQWST Overview*
- ✓ Lesson-specific strategies embedded in the Teacher Edition
- ✓ Literacy strategies built into the readings
- ✓ Audio versions of readings
- ✓ Strategies modeled in PD
- ✓ Biographies/Career Narratives that enables students to see themselves in STEM
- ✓ IQWST Teacher Portal Support Site
- ✓ IQWST Facebook Group
- ✓ Spanish Student Editions for EL students

DEDICATED SUPPORT TEAM

Our team of experienced Product and Customer Support Specialists are ready to resolve any questions or technical issues in a timely manner.