



IMPROVE ENGAGEMENT & RETENTION WITH HANDS-ON LEARNING

The data are in: Hands-on learning promotes higher engagement, deeper understanding and improved outcomes. See how.

Educators at every grade level and in every content area understand the importance of student engagement to learning and outcomes.

Students who are engaged are attracted to content and assignments, according to education-consulting firm [SoundOut](#). These students work through challenges and blocks and are proud of their achievements. Engaged classrooms have an energy that promotes deeper thinking, better problem-solving and motivated, independent learning.

Disengaged students, however, perceive school as a drudgery. To the casual observer, they look engaged — they attend class and do their work, and most are even well-behaved. But a report from the University of Wisconsin-Madison shows that these students are uninterested in subject matter, give up easily and take little pride in learning.

So what can schools do to drive engagement in their classrooms? What's the secret? Many educators are finding success with hands-on learning strategies.

HANDS-ON LEARNING WORKS

Research shows that getting students actively involved in learning reaps tangible benefits.

A [Carnegie Mellon University study](#) measured the difference in the effectiveness between interactive learning and traditional instruction. Researchers' measurements found that interactive activities are six times more likely to help students retain and master content than other types of lessons.

Another study, conducted at Purdue University, investigated the effectiveness of hands-on engineering-design projects on learning outcomes between two groups of eighth-graders attending a school in rural

Indiana. One group was taught a lesson on water quality using textbooks and lectures; the other group spent 90% of instructional time designing a functional water purifier. A [comparison of pre- and post-test results](#) revealed that the hands-on learners made more improvement and got higher scores than the other group. The gains were particularly significant among ELL students.

Why is interactive, hands-on learning so effective? [Researchers](#) from the University of Chicago analyzed brain scans of students who “physically experience difficult scientific concepts” and found that hands-on learning triggered the sensory and motor-related areas of the brain when students revisited concepts they experienced in class. As a result, these students developed deeper understanding and posted higher quiz scores.

Higher test scores are important, of course, but the bigger benefit is the improved retention. Better retention of existing knowledge makes learning new knowledge easier. This virtuous cycle improves student achievement in school and life thereafter.

STUDENT ENGAGEMENT STRATEGIES

In a SmartBrief poll on student engagement, 57% of respondents reported that the biggest challenge they face today is student engagement and motivation. The data also outlined the strategies that schools and districts are using to get students involved in and accountable for learning:

- **37% facilitate collaborative projects** to give students a break from lectures and books and create

authentic opportunities to learn the core concepts of teamwork that are crucial to career readiness.

- **30% promote student-led or student-directed learning** to foster student accountability and enable learning at each student’s own pace.
- **28% celebrate success** to provide important external recognition and reinforce students’ pride in their own accomplishments so they stay motivated and aspire to learn more.

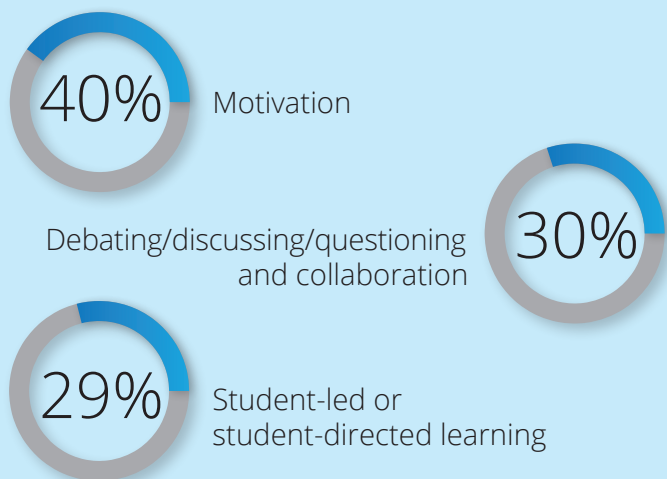
This mix of strategies empowers students with more choice and control over their learning, and it improves satisfaction and confidence. They also learn more as they discuss their thoughts and consider other students’ insights, and they understand valuable teamwork concepts as they collaborate on projects. This combination of inquiry and interpersonal skills is vital to students’ academic and career success.

Interactive lessons also benefit learners needing extra support, particularly English language learners and special-education students.

Results from the SmartBrief survey indicate that hands-on learning experiences (49%) and the presentation of information in different formats (23%) are the most-used student-engagement strategies for students needing additional support.

A [report](#) from Engineering is Elementary, a project of the National Center for Technological Literacy at the Museum of Science in Boston, surmised that these strategies are effective for these students because “even if they may not articulate the precise vocabulary words,

ENGAGED LEARNING OUTCOMES EDUCATORS VALUE MOST



Source: SmartBrief student engagement poll, April 2016

CONCEPTS COME ALIVE WITH ZSPACE

When students are engaged with hands-on learning, “all of a sudden, the concepts come alive,” explains Pamela Donald, science and anatomy teacher at the Bradwell Institute, part of the Liberty County School System in Georgia. “They’re open, they’re receptive, they’re energetic.”

Donald recalls a student in her Environmental Sciences class who wasn’t interested in a lesson on the biome and ecosystems. “He was like, ‘I just want to put my head down. I really don’t want to hear this.’ Then I brought the class into the lab and gave them one of the zSpace activities, and he took the lead and was explaining to everyone.”

they can express their own ideas by manipulating materials and demonstrating what they know.”

INTERACTIVE LEARNING ACTIVITIES

Here are some tips for improving student engagement and achievement with hands-on learning:

- **Engineering:** Sixth-graders in the New York's Plainview-Old Bethpage School District are using zSpace's software, Franklin's Lab, to design electrical circuits. "Then they're going back in to the tech shops and actually designing their own electricity boards," says Joyce Barry, the district's chairperson of K-12 science, research and technology. "Then they're going to go back to the [VR lab] to design these electricity boards that we would never be able to afford or be able to let them do for safety reasons."
- **Science:** The most engaging science activities solve real problems in the field or in a lab. Use issues in the news such as water quality, biodiversity or drought, and challenge students to investigate solutions. Hands-on science projects teach skills that transfer to other content areas and possible career tracks.
- **Math:** Bring math to life by asking students to develop their own problems and solutions based on something they want to buy or make. "I ask kids to write down something they want to buy or do and to estimate the funds they need," explains Steve Peha of Teaching That Makes Sense in Carrboro, N.C. "Then they have to figure out what they can do to make that money and how many hours or weeks it will take to earn it. Or I ask them to think about a place they'd like to visit, how long it will take to get there and how much it will cost for gas or tickets. The relevance of these real-life activities increases engagement and gets even reluctant students motivated to do the math that goes with them."
- **Technology:** Even if you don't use flipped classrooms, integrate technology into lesson delivery and class work. Educational technology — from tablet-based curriculum to virtual reality — is particularly important for today's digital-native students, [according to Emily DeRocco](#), education and workforce director with Detroit-based Lightweight Innovations for Tomorrow. Expanding teachers' use of cutting-edge technologies is "incredibly important" for engagement since a blended world is the one in which our students live, learn and work.
- **Field Trips:** Get students out of the classroom, whether in real life or through a virtual field trip enabled by global online chats, interactive videos or virtual reality software. These opportunities to interact with professionals in the field, see art up close or talk to students in other cultures are high-relevance student-engagement activities for content areas such as social studies, art or career education.

Interactive learning makes education come alive. How can your district integrate more hands-on learning into your classrooms to improve engagement and prepare students for life after school? ■

“Higher test scores are important, of course, but the bigger benefit is the improved retention. Better retention of existing knowledge makes learning new knowledge easier.”

ABOUT ZSPACE

zSpace is a leading-edge technology provider that delivers a new way of learning with its flagship product, zSpace®. Focused on STEM education, medical instruction, and corporate training, zSpace inspires and accelerates understanding through real world virtual reality. zSpace was named “Cool Vendor” by Gartner, Inc. and awarded “Best New Product” by Tech and Learning Magazine. zSpace is a privately held, venture backed company located in Sunnyvale, California, and has filed more than 30 patents for its innovative technologies.

For more information, visit www.zspace.com, or follow on Twitter [@zSpace](https://twitter.com/zSpace).

sponsored by

