Why Hands-On Learning MATTERS

9 REASONS TO USE MANIPULATIVES ACROSS THE CURRICULUM
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Chances are, you’re an old hand at using manipulatives in math class. But did you know that using visual models and hands-on exploration in ALL subjects, including science, Language Arts, and social studies, can help students learn and retain information more effectively, and become more creative and collaborative problem solvers?

Indeed, research (and awesome classroom teachers!) have shown time and again that meaningful, hands-on learning experiences are more effective than assigning a chapter in a textbook, giving a lecture, or passing out a worksheet. One Purdue University study, for example, found that eighth-grade science students who built a water purification device far outperformed their counterparts who simply read about water quality and listened to lectures. And that’s just one finding out of many.

If we know hands-on learning works, then why do so many schools feel pressured to do away with projects and focus on skill-and-drill testing? The answer is complicated, but we believe that in order for students to succeed in the classroom and beyond, we must not only embrace hands-on experiences but incorporate them into every aspect of the students’ learning. Here’s why:

1. HANDS-ON LEARNING IS REAL LEARNING.

When students build a LEGO® bridge, make a model from clay, or use toy cars to create a multiplication array, they are dealing with concepts in the real world rather than in a book or a pencil-and-paper problem. They are acquiring knowledge through experience rather than abstraction, and using a greater range of intelligences to solve problems. Multiple studies have found that learning-by-doing leads to greater achievement across the subject areas, including science, math, Language Arts, and social studies.

Interestingly, when hands-on learning is incorporated in the classroom, the traditional model has been for students first to read a textbook, watch a video, or listen to a lecture, and then do a project. But research suggests that the reverse order, in which kids do the hands-on activity first, may actually be more effective.

IDEA TO TRY: Open a lesson on habitats by challenging students to create and program an alligator that can sense when food is nearby, using the LEGO® Education WeDo Set and Software. Challenge your students to research what alligators eat and where they live, then draw and cut out the various food sources and prepare information sheets or a presentation to explain their behavior findings along with their working model.
2. HANDS-ON LEARNING KEEPS KIDS FOCUSED.
Reading a book or listening to a lecture can be a challenge even for the most focused student. Studies have shown that people engaged in a simple hands-on activity while listening to a message are more likely to retain details of what they have heard. Sketching, building with blocks, or cutting with scissors are all techniques that can help students focus on the subject at hand.

IDEA TO TRY: Begin a lesson by giving students a hands-on challenge, e.g., “Can you make a model of the number 100 using LEGO® bricks?” Then as students work, use the opportunity to explain the concepts that you are teaching in more detail (the base 10 system, for example, or place value).

3. HANDS-ON LEARNING FOSTERS CREATIVITY.
Teachers intuitively understand that cutting, drawing, building, sewing and other forms of hands-on activity can help kids tap into other parts of their brain, devise different solutions, and finally land on that light bulb moment. Unsurprisingly, the research also confirms a direct link between hands-on learning and creativity.

We believe that link matters now more than ever. While creativity has been named a 21st-century skill and a key contributor to workplace success, too many teachers feel they don’t have the time to incorporate creative projects into their days, and too many kids are doing less and less with their hands, unless you count texting or typing with their thumbs.

But hands-on projects don’t have to be an elaborate “add-on” to an already busy day, nor should they be. Rather, our challenge is to look for opportunities where a simple hands-on task can replace or supplement a traditional assignment.

IDEA TO TRY: Look for a short assignment that you do every day that you can replace with a quick hands-on activity. If you have students spend a few minutes free-writing at the beginning of writer’s workshop you could have them use LEGO® Education StoryStarter to build a short scene to write about instead.

4. HANDS-ON LEARNING INSPIRES TEAMWORK.
Collaboration—another one of those crucial 21st century skills—is a natural byproduct of students learning by doing. Whether kids are completing a group project or an individual task, they’re asking questions of one another like “Can you pass me the red one?” “How’d you do that?” and “Can I show you what I did?”

This kind of communication leads to natural conversations about teamwork and the best ways to collaborate. Just as students learn key concepts through trial and error, they learn to work together and begin to understand the roles they can best play on a team.

IDEA TO TRY: When working in groups, establish roles such as recorder, organizer, and captain that students can rotate through to experience the different aspects of working on a team.
5. HANDS-ON LEARNING ENCOURAGES FAILURE.
Recent research suggests that in many communities, we are raising a generation who doesn’t know what it’s like to fail, and in doing so robbing it of an essential learning experience that is critical to success in and out of the classroom. In fact, one French study found that kids fail less when they know failure is part of the learning process.
Failure teaches the importance of perseverance and hard work, but it is also a fundamental part of any career trajectory that students might choose. When students build an unsuccessful model of a pulley, for example, they not only see engineering principles in action, but also learn that failure plays a central role in the design process. They learn to ask questions like “What went wrong?” “What can I do differently next time?” and “How can I make it better?” These are the types of questions they will ask in the workplace and in their relationships for the rest of their lives.

6. HANDS-ON LEARNING LETS STUDENTS BECOME THE TEACHERS.
When students complete a hands-on activity and talk about what they have created, whether it’s a LEGO® pulley, a rainforest diorama, or a model of a wigwam, they instinctively assume the traditional role of the teacher and engage in the final step of the learning process—explaining the concept to others. You can’t stop a kid who’s proud of her working volcano and wants to show it off to the world!
This “teaching” step not only strengthens the speaking and presentation skills of the creator, but reinforces the message for all students that expertise is everywhere, and that the learning process is a continual back-and-forth between gathering information and sharing it with others.

IDEA TO TRY: Set up an interactive museum where kids can display their hands-on creations and share them with others. You might use the LEGO® Education WeDo Set and Software, for example, to have partners build programmed models of animals, machines, and more, and then demonstrate their creations to the class.

7. DIFFERENTIATION AND HANDS-ON LEARNING GO HAND-IN-HAND.
It may seem counterintuitive, but differentiation actually becomes easier the more hands-on approaches you use. There may be no quicker way to assess a student’s background knowledge, for example, then to have them draw or build a quick visual model. When beginning a unit on fractions, for example, you might challenge students to use LEGO® bricks to show ¼. At a glance, you’ll be able to see which students are struggling and which are far ahead. Similarly, you could ask small groups of Language Arts students to perform a one-minute sketch explaining a literary term.
As you progress with your teaching of a concept, it’s easy to make adaptations to a project based on students’ current levels. You might limit the materials available to a student who’s still mastering the concept, for example, and provide more possibilities for advanced students. Or you might pair a stronger student with a struggling one, since, as we’ve mentioned, hands-on learning lends itself to students as teachers.

IDEA TO TRY: Brainstorm an assessment at the beginning of a unit that you can replace with a hands-on activity. The activity should be highly visual so that you can see students’ current skill levels at a glance. For example, use the LEGO Education BuildToExpress Set to challenge students to build a model that shows how they “see” a particular historic event, or what they “know” about a science concept.
8. HANDS-ON LEARNING SUPPORTS THE COMMON CORE.

The public perception of the Common Core State Standards may be one of more worksheets and more tests, but the reality is that these kinds of assessments don’t really meet the depth of analysis and learning that the new standards require. Indeed, “learning by doing” is underscored throughout the Common Core through the use of visual models (in both English and math), speaking, listening, and synthesizing information from multiple sources.

The bottom line? Don’t fall for statements like, “Oh, with the Common Core we don’t have time for projects this year.” The Common Core is about creating, testing, and refining knowledge, and there’s no better way than hands-on learning to do it.

IDEA TO TRY: If your district requires writing a daily objective tied to the Common Core, try including a hands-on challenge below it. For example, for standard CCSS.ELA-LITERACY.RL.3.3, you could have students use the LEGO® Education StoryStarter set to first construct a character in a given scene, and then explain how he/she contributed to that scene.

9. HANDS-ON LEARNING IS FUN!

While there is no doubt plenty of pedagogical theory and research to support hands-on learning, we don’t want to lose sight of the simple fun and lightbulb moments that come from building, creating, painting, sculpting, hammering, and gluing. These are the projects that kids remember, the ones they keep in memory boxes under their beds, the ones they stay up late at night to finish.

Learning by doing brings joy to classrooms and to students’ faces, and igniting this joy is simpler than you think. It starts with a few basic supplies and a question that invites exploration. “What would happen if…?” “How can we solve this problem?” “What happens next?” And these questions evolve into the kind of hands-on learning that brings real learning and achievement. You can get there. We believe in you.
ABOUT LEGO® EDUCATION
Since 1980, LEGO® Education (LEGOeducation.us) has delivered hands-on, curriculum-based resources for teachers and students worldwide. LEGO® Education believes a hands-on, minds-on approach helps students actively take ownership of the learning process and develop 21st-century skills such as creative thinking and problem solving through real-life, engaging experiences.

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