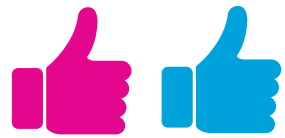


04



Students who are confident in learning STEAM subjects are more than twice as likely to say they were confident in school today.

"Confidence will push [students] through and allow them to push themselves further."

- Nadine Jacang
U.S. LEGO Education Master Educator

The power of real-world scenarios

In order to prepare students to be career-ready for 21st-century employment, educators must adopt an interdisciplinary learning model. They need tools that support their capabilities and provide room for failure and iteration, so that students can find the increased independence and confidence needed to learn effectively.

The *FIRST* LEGO® League, FLL, provides just this type of real-world scenario. Through this international robotics program, teams of young people aged 9-16 assemble and compete with robots designed to accomplish tasks associated with a real-world challenge. A 2013 study by Brandeis University shows that increased student confidence is one of the positive outcomes of participation in the program.

Parents report a positive impact on their children from participation in FLL, confirming that the program has helped to increase young people's interest and engagement in science and technology, improve their social skills and build their sense of self-confidence. Eighty-seven percent

of parents reported that their child's sense that he or she could succeed if they tried hard had increased; 82 percent reported increased confidence speaking in front of a group; and 71 percent reported an increased sense of self-confidence concerning school and schoolwork.

A Baltimore elementary school was recently profiled in the New York Times for using LEGO materials to tackle complicated problems. Students divided into teams to build "battlebots," LEGO-based robots, to spar in classroom competition. By identifying the strengths and weaknesses of their designs, students learned adaptability, resilience and critical thinking in fun, collaborative situations.

Confidence is reinforced over time

LEGO Education products help to ensure that confidence builds year after year, from pre-K through secondary education. Our mission is to make learning playful, engaging and relevant with hands-on tools for a wide variety of curricula. Students develop skills for the 21st century, notably in STEAM, coding and robotics—learning experiences that are both engaging and relevant in today's world. We believe that through this mission we can build students' confidence in their ability to learn and solve problems, setting them up for lifelong success in a rapidly and continually changing world.

01

Lifelong Learning Starts with Confidence

Students' confidence in their ability to learn and solve problems sets them up for lifelong success.



By learning through purposeful play



With hands-on collaborative experiences



For lifelong success

Confidence is a mindset: to explore and take risks with a strong, positive belief in one's ability to achieve the goal. It promotes the willingness to try something new, to embrace the process of learning and work towards achieving mastery in a specific topic. It builds the belief in knowing that failure is a part of learning; it's about being willing to get out there and try; putting ideas on the line; and believing in oneself as one works towards a goal.

The task for educators and administrators is to help students build their futures. They must apply varied strategies and tools to ensure their students have every confidence in their ability to learn and acquire the requisite skills for current world needs.

A recent article by Saga Briggs notes that student confidence may influence performance by as much as 12 percent. Students' confidence in their ability to learn and solve problems is a key determinant of educational performance. In fact, confidence, often defined as self-efficacy, seems to be a more important predictor of academic performance than self-esteem. That means that building confidence is a key component of academic and lifelong success. So how do we cultivate this belief in students in such a way that they embrace trial and error, solve challenges big or small and welcome the process of learning?

Can confidence be taught?

Ned Sheehy, a LEGO® Education Master Educator, acknowledges the complexities of building confidence in students:

"Students need confidence to allow them to explore and be exposed to higher-order thinking skills. When children are asked to step beyond memorizing and repeating what the instructor is doing, they need to believe that they will not experience negative consequences for unsuccessful attempts."

- Ned Sheehy
U.S. LEGO® Education Master Educator

In order to build lifelong learners, students must first enjoy the process of learning, of trying new things and learning from their past experiences. These are the characteristics of learning through play, as researched by the LEGO Foundation, allowing children to develop deep, conceptual understanding to connect concepts and skills, and apply their knowledge to new situations. This creates a complex and compelling task as we consider: How do we build this confidence in our students? What are the main factors among teachers that lead to building confident students? How does this change for students as they develop from preschool through high school?

For more information, visit legoeducation.com

For all stats: This survey was conducted online by The Harris Poll, February 2019, n=5,002 students, n=5,001 parents, n=1,152 teachers, on behalf of LEGO® Education. LEGO, the LEGO logo and MINDSTORMS are trademarks and/or copyrights of the LEGO Group. ©2019 The LEGO Group. All rights reserved.

02

Hands-on learning

Providing opportunity within the classroom for students to work through solving problems is a key to building confidence and preparing for life beyond school. According to a recent poll, 96 percent of teachers believe that hands-on learning builds students' confidence¹.

Through hands-on learning, students are able to absorb real-world experiences and apply what they learn. Students build confidence because they are able to work with ideas, reflect on their experiences and apply effort

into what they create. Classrooms allowing for this type of purposeful, active learning create environments conducive to exploring and creating, allowing students to become confident in their own learning.

An elementary school study found that the use of LEGO experiences can increase motivation and build confidence among students in science learning. Students who participated showed a rise in confidence and were actively involved in the learning process throughout the lessons. The LEGO Education portfolio of products grows with students as they engage at every level, providing hands-on experiences that strengthen confidence.

Learning through play enables students to achieve learning outcomes

Cultivating confidence creates a safe environment for students to actively engage in their learning through more

collaborative projects and playful experiences.

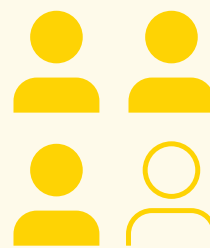
New research released by the LEGO Foundation in March 2019 demonstrates that when students engage in learning through play, these experiences support students' confidence and are highly effective in achieving learning outcomes.

As illustrated in the new report, an increase in confidence as measured by self-efficacy was related to higher understanding of concepts; more positive changes in science, problem-solving and mathematics; and greater motivation and enjoyment in learning. The students who think they are more skilled in math do better in math.

LEGO Education builds confidence

LEGO Education believes that confidence is having the belief in your ability to learn, to accomplish something with what you know. It's being comfortable trying something

03



3 out of 4 teachers say anxiety and lack of confidence hinder learning among their students.

you've never done before without worrying about a right answer.

At LEGO Education, we view the classroom as a catalyst for building confidence. Our development of learning tools allows for solutions that are rich in experiences for students to explore, take risks and develop mastery through solving problems. Our approach scaffolds learning to build confidence through providing guided-practice support that is gradually removed. As students approach open-ended problem-solving challenges, they have built trust in themselves and their skill in finding solutions and tackling more complex problems.

As students build confidence in one area, they often start to feel more confident overall. A 2018 study by Cukurbasi and Kiyici found that students believed their success with LEGO materials led to their ability to "learn how to learn" and problem-solve effectively. Student confidence can be linked to engagement when considering how these students also connected their abilities to their interest in school.

A mindset to overcome obstacles to learning

As teachers and administrators, we must ensure students are comfortable applying themselves and demonstrating and reflecting on their experiences. As educator Ted McCain writes in his 2005 book *Teaching for Tomorrow*, the reason students are "unable to apply themselves is because they are afraid of not measuring up." He makes the argument that if we are too focused on students providing answers then we create a system that restricts creativity

and innovation. McCain makes the argument, "Failures are liked skinned knees—they are painful but they heal quickly and are learning experiences."

As educators, we need to provide opportunities for students to approach new and different experiences. We need to allow students to work through problems, overcome failure and deepen their understanding of how the world works. Much like teaching a child to ride a bike, students need more than one opportunity to wrestle with new ideas and iterate to find confidence and mastery of their solutions.

Embracing failure as part of the learning process

Students will not be willing to take risks if they are not comfortable making mistakes. Students often will disengage or shut down when faced with challenges if they fear getting the answer wrong or receiving negative feedback.

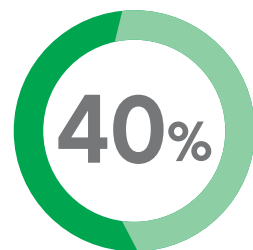
Students who are comfortable using a process of iteration—looking at successes and failures—are more likely to be confident in their learning. Studies have shown that LEGO applications boosted students' motivation (Ortiz, 2015; Blikstein, 2013). Other studies established that students working with LEGO products, such as LEGO MINDSTORMS® Education EV3 robotics, are more confident presenting solutions after taking time to work through mistakes coupled with a feedback process.

Teachers testify to this as well. Nadine Jacang, LEGO Education Master Educator, acknowledges that:

Parents and teachers say:

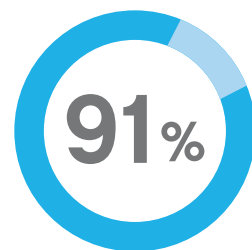


of parents say hands-on learning helps children retain knowledge for the future.

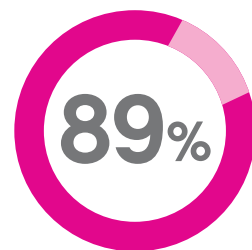


of teachers say their students usually or always get substantial time during the school day for hands-on lessons.

Teachers and students agree:



of teachers would like to integrate more hands-on lessons, and list lack of time and curriculum restrictions as the top obstacles.



of students say that hands-on learning helps them learn new things.

¹A global poll of students, teachers and parents, fielded by Harris Insights & Analytics.