

The Rising Value of Makerspaces in Education

The way we teach kids is changing. They are growing up in a constantly connected, media saturated world where we are all both consumers and producers of content. Alongside traditional subjects like math, reading, and history, we need to teach problem-solving and critical thinking, creativity and collaboration. These are the skills that our K-12 students will need to succeed in our rapidly changing world – as we prepare them for jobs that haven't even been invented yet. It naturally follows then, that the spaces in which we teach kids need to evolve too.

Long gone are the days of teaching content. School once served as the gatekeeper of facts and theories - now we walk around with the entire encyclopedia at our fingertips. Memorizing facts has become an antiquated skill – far more valuable is knowing how to search for facts and how to verify them. Gone are the days of practicing rote methods for solving problems – the problems of today are so complex that they require out of the box thinking and creative strategies that integrate and synthesize knowledge from diverse, interdisciplinary fields.

Kids aren't learning these skills in traditional classrooms. There is still, and will always be, a need for building foundational knowledge – the core elements of reading, math, science, and history remain essential to place everyone on the same page. But from there we need to develop children as flexible thinkers, give them tools to analyze, critique, curate, and evaluate the rapid influx of information available in this digital age. We need to develop lifelong learners who understand how to explore and integrate new knowledge.

Thirty desks facing a chalkboard is not going to get us there. But makerspaces might.

'Makerspace' is the catchall phrase for a wide variety of environments that contain an ever-growing list of tools. But the essence of all makerspaces is the same - a physical place where people can come together to collaborate, share ideas and expertise, and use tools and supplies to bring concepts into physical being. In other words, to make things. Makerspaces are not the silver bullet for solving all of our educational woes, but they can get us closer to developing creative, collaborative thinkers who are prepared to solve the problems of tomorrow.

What is a Makerspace?

The glass walls surrounding the [Collaboratory](#) at the Wallingford Public Library send a clear message – what happens here can be shared. Walking through the doors, you see a variety of stations positioned around the room. There is a green screen set up for shooting video and a soundproof booth for recording audio. A row of computers lines one wall, each loaded with multimedia editing software and connected to full color printers of different scales. A shelf houses digital cameras, GoPro video recorders, and headphones. A charging station sits in a corner, providing a constant supply of battery life.

The middle section invites collaboration – large moveable tables fill this open space, with shelves of board games and puzzles on either side. Art is created here - with cabinets full of craft supplies open to all who visit, overflowing with popsicle sticks, colored paper, markers, paint, Perler beads, and yarn.

Small looms sit on a countertop, while a large-scale loom stands in front of a window, hung with the most recent community art project, inviting all to weave.

Cordoned off in a separate area are the machines for sewing, serging, embroidering and quilting. Laser cutters, die cutters, glass engravers and 3D printers meld creation with the latest technology. Mini robots like Ozobots, Spheros, and LittleBits droids are available to program and play.

It is hard to enter this space and not feel inspired to create *something*.

History of Makerspaces

Makerspaces emerged in the early 2000s, fueled by the rise of the Maker Movement. Perhaps in response to the growing time individuals were spending on digital devices, the Maker Movement encouraged us all to go back to our roots and our desire to work with our hands. Knitting, gardening, and sewing quickly found a new renaissance. At the same time, prices in technology rapidly decreased, placing in the hands of many basic tools of creation – digital cameras, affordable editing software, and online places to share user-generated content. The renewed passion for handcrafts met with this influx of affordable technology, and suddenly people were making all sorts of things.

As making began to trend as a national pastime, makerspaces naturally emerged.

Some makerspaces take the form of collaborative artist workspaces – filled with communal craft supplies: fiber arts, looms, sewing machines, Perler beads, and scrapbooking kits. Others focus more exclusively on providing access to high-end machines that aren't affordable for the average family: woodworking tools, 3D printers, laser cutters, and die cutting machines. Other makerspaces take on the role of multimedia labs with: video cameras, green screens, animation stations, recording booths, and high-powered computers. There is no one way to construct a makerspace, the key features are a sense of community and an open-ended invitation to make. Even without a budget, one can set up a makerspace simply by filling carts with generic recycled or donated building materials, such as cardboard, tubing, wires, and popsicle sticks.

Making: A Critical Skill for the 21st Century Learner

The Needs of Learners are Changing

For many years there has been a push in K-12 education to develop students into 21st Century Learners. These 21st century skills include creativity, problem-solving, critical thinking, and collaboration. These are the skills that many envision will be needed in order to be successful in our rapidly changing, technology-enhanced world. In the past, the ability to repeatedly perform a task without error was a valuable skill in manufacturing and production. However as robotic technology evolves, this skill is becoming obsolete. Rather, new jobs will require workers who are proficient with technology, able to creatively address complex problems, and capable of working together with others from divergent fields. The new economy will require an understanding of computational thinking, digital literacy, and innovative problem solving.

We know these 21st century skills are not fostered in the traditional K-12 classroom. Emerging learning science shows us a better path to helping students make meaning and develop skills. Problem-based learning and a constructivist approach to education have gained traction over the past decade, infiltrating the classroom from kindergarten all the way through graduate school. These hands-on approaches often require access to tactile building materials, art supplies, hardware and software. While it's possible to bring these supplies into a classroom, it would be much easier to keep them in a centralized location, available for all teachers and classes to use.

Makerspaces provide a natural space where teaching and learning organically occur. Technology and fun, play-based learning are natural attractions for kids who are eager to learn, explore and experiment. This type of teaching is antithetical to the standards-based, strict testing environment we currently are witnessing in K-12 education. Innovative technology, hands-on tools, and creative choice can lead to better engagement and the ability to compete for attention from the social media and gaming generation. Makerspaces can make that shift in education happen.

A Makerspace inspires creativity.

These informal learning spaces are set up as an invitation to explore and generate curiosity. By strewing different materials around the room, creating dedicated stations, and bringing together a variety of materials, we can encourage students to push their own creativity forward.

A Makerspace introduces new technology.

A shared makerspace within a school democratizes access to tools by providing access for all. Bringing new technology into the classroom can be an expensive endeavor, but investing in shared equipment can open up the opportunity to explore coding, engineering, manufacturing and robotics.

A Makerspace encourages iterative design.

Setting up challenges can encourage students to find thoughtful solutions by employing design thinking methodologies, which mimic the way problems are solved in the real world. The iterative design process teaches kids that there is no single right answer or solution, by pushing continuous updates and improvements based on feedback.

A Makerspace invites collaboration.

A key feature of any makerspace is the idea of collaboration – an open invitation to share ideas, ask for help, and offer assistance to others. The design of a makerspace should include ample room for groups to come together and work through problems.

A Makerspace provides a safe place to fail.

Designed to be a safe space to fail forward, the maker mindset encourages creativity and embraces failure as part of the learning process, while building grit and persistence.

Makerspaces Have the Potential to Change Education

As the value of makerspaces becomes apparent to educators as a way to encourage creativity, collaboration, and critical thinking, we will begin to see them pop up in schools. With limited space in the tight K-12 curriculum, makerspaces have started to emerge in self-contained pockets – as stand-alone afterschool programs or spare closets in the school library. These sit outside of most students'

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daily experiences of school. The next step is to integrate more robust makerspace classrooms into the physical layout of our schools.

If we are going to be successful in preparing our students for success in a future we can barely even imagine, we need to be forward thinking. This includes not just our approaches to teaching and learning, but the physical spaces in which students can engage with materials and tools as well. Makerspaces can have a huge impact on the learning experiences of K-12 students, one which will instill the critical skills our students will need to face the challenges of tomorrow.