Enhancing school education with project-based learning and 3D printing

Ultimaker

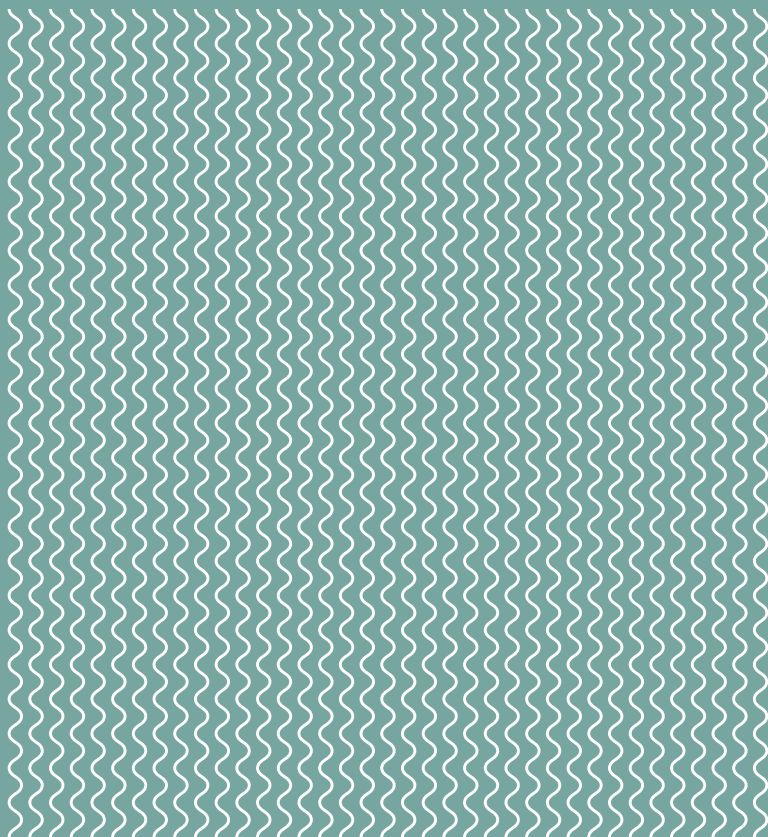**Enhancing school education with project-based learning and 3D printing**

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Introduction

An increasing number of K-12 school districts are creating project-based learning environments through hands-on applications such as makerspaces and 3D printers, according to a recent survey conducted by District Administration, a national publication for school administrators.

More than 200 school administrators from around the U.S. participated in the survey, which was conducted in July 2020.

K-12 education in the US is equivalent to primary and secondary education in other parts of the world, covering the ages of 5 to 18.

In this white paper based on the research and insights from educators, you'll find tips on the sorts of tools that can be used to enable project-based learning and how they are being used.

91% of respondents said that they believed project-based learning was more effective and impactful than traditional teaching methods, while 97% of those using 3D printers said that they had enhanced student learning.

Makerspaces and innovation labs

Some 91% of respondents said that they believed project-based learning was more effective and impactful than traditional teaching methods alone. Another 66% said that their school or district had a makerspace or innovation lab, or otherwise provided maker activities or programs for students. When asked which grade levels used their makerspace or innovation lab, results were almost evenly divided: 57% said elementary, 66% said middle school and 66% said high school.

Of those with makerspaces or innovation labs, 79% said that their spaces included 3D printers, and 97% said that the use of 3D printers had enhanced student learning.

"More K-12 educators and administrators are recognizing that on-site makerspaces and innovation labs provide an effective means of enhancing STEM/STEAM learning pathways and facilitating enrichment and project-based learning," says Matt Griffin, Director of Community Development at Ultimaker. *"3D printers are a natural fit in these environments because they enable students to bring their designs to life in a way that is highly engaging and interactive. They also help students develop problem-solving skills, critical thinking, and creativity—addressing key 21st-century skills."*

3D printers used throughout grades K-12

In the Kootenay-Columbia School District 20 (SD20), a Canadian school system with nearly 4,000 students in 10 schools located near the U.S. border between Vancouver and Calgary, administrators were looking for new ways to create project-based learning opportunities that build critical thinking skills.

SD20 educators visited the MIDAS Fab Lab, a local fabrication laboratory managed by nearby Selkirk College, to learn more about the technology and equipment that could help meet their goals. MIDAS (Metallurgical Industrial Development Acceleration and Studies) Fab Lab provides access to a wide variety of technologies for digital fabrication and rapid prototyping, as well as a research and development lab, metal shop, wood shop, computer lab and more, and was established through an innovative public-private-postsecondary model to drive economic development in the local community.

Mike Page, a vice principal in SD20, says one of the technologies used at the lab stood out as a tool that the district could implement quickly and easily. "We were focused exclusively on the Ultimaker 3D printers because we'd seen first-hand the ease-of-use and knew they were ready to go right out of the box—a must for us to successfully roll out across grade levels," Page says. "Plus, the printers met our feature and functionality requirements, such as active leveling to minimize errors and support for two colors, driving us to invest in two Ultimaker 2's and five Ultimaker 3's."

Teaching creativity and resilience

The Ultimaker 3D printers were soon used in classrooms throughout grades K-12 at SD20, spurring creativity and exploration and helping to build critical design-thinking techniques.

For example, students in K-3 participated in a lesson plan about how all people are unique, like snowflakes, and were asked to draw a snowflake of their own creation. Those designs were then passed to students in grades 5-7 who advanced the designs for 3D printing, bringing the snowflakes to life and giving the younger students a product to take home for the holidays.

"Our vision is to be an inclusive learning community where everyone has the opportunity to achieve their full potential and be empowered to pursue their aspirations," says Page. "Implementing 3D printing into the curriculum has led to the development of real-world skills, such as problem solving and teamwork."

Page says the 3D printers also develop perseverance and patience, as students often need to rework a design and try again if the final product isn't up to par. "It's incredibly powerful to see kids print something multiple times before it works, taking the time to understand what adjustments to make and not giving up," says Page. "We are teaching kids a great life lesson to adapt and be strong, while staying the course."

3D printers are enhancing learning

The DA survey suggests that the experience in SD20 is increasingly common: 75% of all respondents said that their school or district is currently using 3D printers for learning in some capacity. When these respondents were asked if they would describe their 3D printers as a good investment that has positively impacted learning, some 97% said yes, with 53% of them selecting "Definitely."

Of the respondents not currently using 3D printers, 59% said they thought their school or district would be purchasing and using 3D printers for learning in the future. Some 95% of all respondents said that they viewed 3D printing as a technology that can enhance curriculum and better prepare students for college and future careers.

"The use of 3D printers in K-12 continues to grow, because educators are seeing their potential as powerful learning tools that can be used at all grades levels and in all educational contexts, including in-school and after-school enrichment and camps,Ultimaker's 3D printers are not only ideal for developing creative young minds, but they are also designed to meet the demands of the classroom, being renowned for their reliability, ease-of-use, and the maturity of their technical support infrastructure. Educators all over the world are using Ultimaker 3D printers to engage students in learning and prepare them with key digital skills for their future careers."
Matthew Griffin, Director of community at Ultimaker

Prepare pupils and students for tomorrow's world, today. 3D printing in education sparks creativity and imagination, providing students with unique learning opportunities across science, technology, engineering, art and math.

Learn more about the industry leading 3D printing solutions from Ultimaker

About Ultimaker

Since 2011, Ultimaker has built an open and easy-to-use solution of 3D printers, software, and materials that enable professional designers and engineers to innovate every day. Today, Ultimaker is the market leader in desktop 3D printing. From offices in the Netherlands, New York, Boston, and Singapore – plus production facilities in Europe and the US – its global team of over 400 employees work together to accelerate the world's transition to local, digital manufacturing.

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