MAKERS EMPIRE

Bringing 21st Century Learning to K-10 Classrooms

Introduction

The New Media Consortium educational expert panel has observed the trend that more and more schools have embraced 3D printing as a part of their technology integration into their curriculum offering and attribute four major factors driving the adoption of 3D printing in schools (Horizon Report K-12 2013):

- stimulating students' imagination, creativity and independent thinking,
- having broad cross-curricular applications, for example, students can design, make and assess different kinds of products applicable to ELA, Science, Social Studies, Creative Arts and Technology Education (tech education is also course for pre-engineering tech or CTE course).
- making abstract concepts tangible
- developing spatial intelligence and design process and teamwork skills.

Makers Empire has been designed and developed to provide students even from elementary school with user-friendly tools and everything a school needs to get started with their favourite 3D printers to assist in increasing in student engagement and participation in STEAM without the need to learn CAD or have technical expertise. Makers Empire provides the 'why' and 'how' to 3D in schools.

How does Makers Empire help schools get started?!

Makers Empire *3D Printing Learning Program* makes it easy for schools to start utilizing 3D design and printing to engage students in active learning, enrich their learning experience, enhance their understanding and mastery of abstract concepts and their learning by:

1. Providing lesson ideas where 3D design and printing can be used in classroom aligned with 21st century learning standards
2. Making 3D design software so easy to use that teachers and students K-10 can create 3D designs in minutes
3. Providing teachers with tools through the Teacher Portal so they can collect, evaluate and manage students' designs
4. Enabling teachers to engage self-paced professional development with online resources
5. Keeping the 3D printing hardware agnostic so it works with many different 3D printers

Makers Empire lesson plans embed student learning objectives and measure up to learning standards such as:

- Common Core Learning Standards,
- Next Generation Science Standards,
- ISTE Technology Standards.
- Partnership for 21st Century Skills


Design & Make a product

Applicable US Common Core Math and ELA Standards, Next Generation Science Standards and ISTE Standards: Grade 6

Common Core ELA Standards

Writing:

CCSS.ELA-Literacy.W.6.1: Write arguments to support claims with clear reasons and relevant evidence.

CCSS.ELA-Literacy.W.6.2.d: Use precise language and domain-specific vocabulary to inform about or explain the topic.

Speaking and Listening

CCSS.ELA-Literacy.SL.6.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and

21st Century Learning Goals

Makers Empire aims to achieve the following 21st Century learning goals:

1. Expose elementary and middle school students to 3D learning in design, creation and making without the need to learn CAD or technical expertise.
2. Expand meaningful use of the school's existing technology or future investment, whether that be Desktop, Tablets and 3D printing; Windows, iOS, and Android.
3. Promote student-centric, active learning through STEAM-oriented and project-based instructional design and learning activities.
4. Create a teacher support network through the Teacher Portal. Teachers can share their 3D design lesson plans and exchange ideas through blogs and discussion forums.

Let students experience the benefits

Lower the barrier to experience the learning outcomes achieved with 3D printing at your school. With Makers Empire, students from kindergarten and up can learn to grasp abstract concepts, manipulate, simulate and design objects in 3D in minutes! No need to spend weeks to learn new design tools and all your designs are 3D printable. Schools no longer have to wait for students to become seniors before they can develop 3D design skills.

Now teachers in elementary and middle school can also use 3D printing

Teachers of different subject areas with various computing skill levels can design and illustrate abstract concepts or creative ideas in 3D on their tablets or desktops in a matter of moments. With Makers Empire teachers can accomplish this without any expensive software, extensive training or prior technical knowledge or experiences.

Spend more time teaching!

Makers Empire helps teachers engage students in hands-on, experiential learning and facilitate project-based learning with a user-friendly classroom management tool set and student design database.

Makers Empire has a dedicated web-based Teachers Portal which allows teachers to easily download and upload, view and evaluate all their students' designs in one place. No need to spend countless hours saving and opening files to view designs.

Makers Empire enable teachers to develop lesson plans aligned with learning standards share instructional strategies and

processes with their peers and access videos and curated lesson plan ideas to see examples of cross-curricular uses of 3D printing in the classroom.

Professional Development anywhere, anytime

Teachers can engage in professional learning when it suits their schedule and where they have access to the “cloud”. Makers Empire cloud-based, self-paced training provides teachers professional development at any time. It is easy and convenient for a teacher with limited 3D design experience to get started here. It is also beneficial for an experienced teacher when s/he needs a little refresher later on in the year or assist/coach other teachers in their plan, adoption and/or design. Schools/districts may also award PD certificates as part of required professional learning.

Examples of how Makers Empire is being used in the classroom

Middle school students explaining their spaceship design

https://www.youtube.com/watch?v=NDYzcTa3IzE

Elementary and middle school students designed items ranging from maple tree taps, pendants, badges, hair clips, coffee mugs and sport trophies within one class.

https://www.makersempire.com/blog/new-yorks-chateaugay-central-school-using-makers-empire-3d-printing-software/

5 year old designing a caterpillar and overview of Makers Empire 3D Printing Learning Program

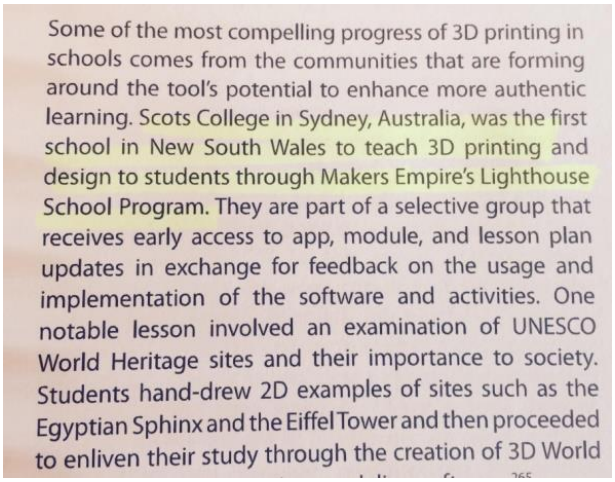
https://www.youtube.com/watch?v=jjTm5Q2xfLw

Middle school teacher explains the Egg Cup design Challenge completed by his students
https://www.youtube.com/watch?v=uX38sMwI0PE

Grade 5 students researched famous US landmarks designed, print in 3D and explained their significance.

https://www.makersempire.com/blog/nys-maplewood-intermediate-school-exploring-3d-printing-with-makers-empire/

Appendix A - Lighthouse Program



Some of the most compelling progress of 3D printing in schools comes from the communities that are forming around the tool's potential to enhance more authentic learning. Scots College in Sydney, Australia, was the first school in New South Wales to teach 3D printing and design to students through Makers Empire's Lighthouse School Program. They are part of a selective group that receives early access to app, module, and lesson plan updates in exchange for feedback on the usage and implementation of the software and activities. One notable lesson involved an examination of UNESCO World Heritage sites and their importance to society. Students hand-drew 2D examples of sites such as the Egyptian Sphinx and the Eiffel Tower and then proceeded to enliven their study through the creation of 3D World

Excerpt from the 2015 Horizon Report

Makers Empire aims to continually innovate to support teaching and learning. From its initial launch we have already customized and released new modules and lesson plans for our partner schools. To ensure our product and services continuously meet our partner schools's needs and help them achieve learning outcomes, we have established in place our school Lighthouse Program.

Makers Empire invites selected progressive and innovative schools to become Makers Empire Lighthouse Schools. They become a leading school in the area of 3D design and printing and become a hub of knowledge-base and promising practice where other schools can come to visit, observe and learn. They are also given the opportunity to see, test and preview Makers Empire products and services.

Appendix B – New York Statewide 3D Design and Printing Pilot Program

Makers Empire 3D Printing Learning Program has been piloted modified and validated in schools in the state of New York. Schools can adopt Makers Empire with confidence to engage students in active, project-based learning, enrich their learning experiences and understanding of abstract concepts and enhance students' capacity to master their learning objectives and measure up desired learning standards.

This year in 2015, New York Institute of Technology, New York State Teacher Center and Makers Empire worked together on a state-wide pilot program to help schools and teaching centers utilize the benefits of design and 3D printing to meet the learning outcomes of students in the state of New York. There are 10 participating school sites located in urban, suburban and rural areas across New York State.

Participants were provided train-the-trainer online professional development training sessions before embarking on their 3D design and printing journey. Schools are supported throughout the year by the project team with regular communications via monthly webinar meetings, weekly group emails and local support provided by the NYIT team.

The Makers Empire team conducted onsite visits to all schools across the state of New York. This allowed the team to observe first-hand the different learning environments and needs of districts. Schools without 3D printers have also been able to participant with access to 3D printers made available by NYIT!