BRINGING 3D MODELING INTO SECONDARY EDUCATION

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AUTODESK.

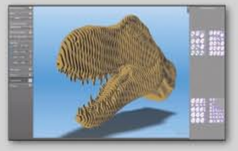
Olin College

AUTODESK 123D

Autodesk has developed a collection of five simple 3D modeling applications aimed for prominence in the consumer computer-aided design software market. They are interoperable and all can post content to a shared 123D online community.

123D SCULPT
Morph, deform, and stylize a digital ball of clay.

123D CATCH
Make a 3-D model of a real-life object by taking a series of photographs.



123D MAKE
Convert virtual solid models to 3-D prototypes using cardboard slices or origami paper.

123D CREATURE*
Create a free-form character using tools similar to those in 123D Sculpt and Design.

123D DESIGN
Design a simple virtual model using and scaling primitive shapes and pre-defined bodies.

*123D Creature is a new addition to the 123Dcollection, and has not been tested by our team. Unlike the other apps in the collection Creature is not free to use.

OUR MISSION

Design a solution that enhances the experience of secondary school students using the 123D software.

OUR SOLUTION: TECHBITS

TechBits are a series of individually-packaged design activities for secondary students. TechBits are small projects designed to empower students to move from ideas to real, physical solutions in their lives by designing with CAD and prototyping physical models. TechBits can be used in core STEM classes, elsewhere at school, or in extracurricular contexts. Having designed TechBits with teachers in mind, we recognize that a champion teacher who is passionate about STEM and design education is the key to successful delivery of the TechBit content.

OBJECTIVES OF TECHBITS

EMPOWER STUDENTS
- Eagerness to explore technology
- Learning the software as they go
- Lower resistance to STEM by exploring STEAM

ACCOMODATE LEARNING STYLES
- Driven by interests, motivations, activities
- Target the TechBit to something students care about

BE SIMPLE & ADAPTABLE
- Create a minimum viable product as a baseline
- build complexity based on grade level, material access
- provide room for extensions

ALLOW EDUCATORS TO LEARN NEW SKILLS
- Provide additional support material for the instructor
- Interdisciplinary TechBits can teach instructors how to merge their material with other disciplines.

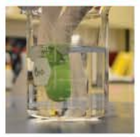
LEVERAGE SOCIAL COMMUNITY
- Use 123D Gallery as a forum
- Use Autodesk Student Community
- Use Instructables community

EXAMPLE TECHBITS

PERSONALIZED 3-D STAMPS

This TechBit guides Makers through the creation of a unique stamp in 123D Design. The stamps can be used to consistently imprint a signature or pattern in clay.

EXPLORING VOLUME BY DISPLACEMENT



Makers learn to compare calculated and experimentally calculated volume. They create a CAD model and calculate its volume arithmetically. They then check the volume of a physical replica by submerging it in water, and compare the two results.

MAKING A 3-D SCRAPBOOK

With the help of an iPhone or iPad, Makers can render 3D models (taken using 123D Catch) in augmented reality. These models can then be compiled into a 3D scrapbook to recount an experience.

COLLABORATIVE DIGITAL SCULPTING

In this TechBit, Makers collaborate to make digital sculptures by passing around iPads in a round-robin activity using 123D Sculpt.

TESTING OF TECHBITS

Working closely with a ceramics class at Revere High School (MA), WE have gained valuable insight into the process of getting TechBits into the world of education. Some key thoughts:

- *The teacher is the most important driving force behind a student's education*
- *Students have fun with each other and engage over this software, taking ownership of their ideas and getting excited about each others' work*

WHAT MAKES A GOOD TECHBIT?

SCALABILITY
- Interesting to students
- Materials are provided
- Interactive & engaging

CONTENT
- Title, duration, end result
- Goals, learning objectives
- Materials and tools
- Instructions and examples

ACCESSIBILITY
- Future-proof
- Learning objectives stated
- Caters to different durations and complexities

USER RESEARCH

STUDENTS

SOCIAL SANDRA
spends most time around friends and on social media

ENGINEERING EUGENE
loves building things and participating in FIRST Robotics

COMPETITIVE CARMEN
focused on swimming, strives to please parents

ACADEMIC ALEX
succeeds in core classes, with an interest in history

TEACHERS

TECH-INHIBITED TEACHER
"I have all these technology tools, but don't know what to do with them."

TRADITIONAL TEACHER
"We're competing with state standards."

CHAMPION TEACHER
"My students need to draw on worldly principles and think on a macro scale."

We performed a series of user visits, user interviews, and classroom explorations to better understand our project's audience. We created 4 personas of secondary school students that are embodiments of different students' learning styles and three teacher personas that represent teachers' relationships with technology.

HIGH-LEVEL GOALS

We believe that Autodesk has the potential to successfully address the need for **STEA(rts)M** education in secondary schools. We aim to increase the adoption of Autodesk products among secondary school students, inciting excitement and **inspiring students** to explore and engage in engineering design. This goal, however, will be approached from **diverse avenues** – literature, sports, art – with the intent of capturing students who might not otherwise be exposed to engineering; **exposure** is an important task, as it is the first step to adoption. We aim to inculcate this behavioral change by keeping sustainability, **inducing excitement** and optimizing learning capacity of students.