

What this is

The *Innovative Instructor* is an article series (<https://ctei.jhu.edu/ii>) and a blog (<https://ii.library.jhu.edu>) related to teaching excellence at Johns Hopkins

Article categories

Best Practice

How to use technologies and apply innovative instructional methods

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Technology

Information about emerging technologies, who is using them, and why you should know

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The Center for Teaching Excellence and Innovation partners with faculty, postdocs, and graduate students to extend instructional impact by connecting innovative teaching strategies and instructional technologies

CENTER for
TEACHING
EXCELLENCE &
INNOVATION



SketchUp

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What it is

SketchUp is a three-dimensional rendering application that uses a sketch-based approach for creating models. It may be beneficial to anyone looking to visualize three-dimensional structures, spaces, or objects. With a free-to-use version available for download, SketchUp is an affordable way to develop 3D models. It is easy to learn compared to professional 3D graphic software packages.

Who produced it

The application was created in 2000 by @Last Software. Google purchased SketchUp in 2006. Under Google's ownership, the program was developed further and integrated with Google Earth to allow importing models for geo-location. In 2012, Google sold SketchUp to Trimble Inc., a mapping, navigation, and surveying equipment company. Trimble continues to develop the application and support SketchUp's growing community of users.

Why it was made

Three-dimensional rendering software is typically complex and requires a significant time investment to learn and use. SketchUp was developed to be intuitive and easy to learn with the intent to bring "3D modeling to the masses." It was used early on by architectural firms to provide quick concept renderings of buildings and environments. Today, the application is used by interior designers, landscape architects, civil and mechanical engineers, and film and video game creators. There are use cases for the



program ranging from exploring building structures, conceptualizing mechanical objects, teaching complex structures, and remodeling houses.

Why it matters

Using your imagination to conceptualize physical spaces is difficult. Communicating ideas and concepts that involve spatial and volumetric relationships in space, such as comparison of size and distance between objects, is often more effectively accomplished by sharing visualizations and renderings of the subject. This allows viewers to have a common point of reference in which to talk about details.

Three-dimensional models offer immersive and engaging aspects that are potentially exciting to viewers. For example, sharing a virtual walkthrough of an ancient city or a 360-degree view of a design prototype can make the experience memorable for your students, which helps them retain the information presented.

Creating three-dimensional models for pedagogical purposes has traditionally required the use of expensive professional modeling applications and highly skilled staff. SketchUp's free modeling tools make the process of creating models an intuitive experience. This can be a great starting point for faculty to produce three-dimensional models and environments. Moreover, your students may not have developed the ability to think spatially. Assigning a course project that involves the use of SketchUp creates an opportunity for learning these skills.

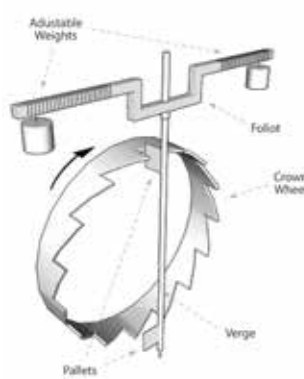




How it can be used

SketchUp provides accurate tools for the rendering of objects and spaces. As an easy entry point for CAD (Computer Aided Design) software, SketchUp can be used in disciplines that require technical drawings and diagrams. For example, SketchUp can be used to conceptualize urban planning initiatives to think through the impact of proposed changes to a community. Resulting models can be shared with stakeholders complete with walk-through animations and annotations to provide additional information.

SketchUp can be particularly useful for design projects in engineering disciplines that require the development of prototypes, such as a design project to develop a radio transmitter and receiver within a size specification that could withstand an impact of 100 pounds of force. Team-members could use SketchUp to map out the circuitry for the electrical components and develop the housing. There are methods to use a SketchUp model to create a physical prototype with a 3D printer.



Example diagram of verge and folio mechanism created in SketchUp

At Hopkins, Bill Leslie, a professor of History of Science and Technology, had in the past required students to build a shoebox diorama of a museum exhibition featuring a topic of their choice. After discovering SketchUp, he offered students the option to create their exhibition space in 3D. The students were unanimous in choosing SketchUp, which improved both the consistency of the projects and the logistics of presenting them to class. Students demonstrated creativity and engagement in the project.

Where it is going

Interest in virtual and augmented reality has increased in recent years. Companies have developed new technologies and methods to offer opportunities for people to experience virtual environments.

Universities have been investigating technologies such as Google Cardboard, Oculus Rift, and Microsoft HoloLens. Currently, there is a lack of content available to make use of these emerging technologies. SketchUp could find itself in a position to be a starting point for the creation of 3D spaces that can be experienced in a highly immersive environment.

How to get started

Trimble offers a free version of the application called SketchUp Make. It includes all of the basic features for modeling. SketchUp Pro is a full featured version that includes features such as solid modeling tools, importing terrain and satellite imagery, dynamic components, and importing and exporting file formats necessary for use in other applications. If you are an educator and plan on teaching with SketchUp, you can request a free one-year license to use the full-featured SketchUp Pro. Students are also able to get a discount on a one-year license with proof of enrollment.

There are video tutorials available for learning SketchUp. These tutorials are often the most efficient way to learn the application and get a quick start on a project.

Other Thoughts

One of the best resources from the SketchUp community is the 3D Warehouse, an online repository for sharing user-generated models. The models found in the 3D Warehouse can be a starting point for your own projects. There are a number of companies that have uploaded professionally created models of their products so if you are looking for a specific model of say, a household appliance, you may find it there.

SketchUp is highly extendable, giving users the ability to develop plugins with the Ruby programming language. The Extension Warehouse is a repository of plugins you may install in your instance of SketchUp. Not all plugins are free, but if you need to have a photo-realistic polish or find a way to streamline a modeling process, the Extension Warehouse may have the answer.

Additional Resources

- Sketchup website: <https://www.sketchup.com>
- Information about educational licensing: <https://www.sketchup.com/buy/resellers?type=education>
- Repository of models: <https://3dwarehouse.sketchup.com/?hl=en>
- Repository of plugins and extensions: <https://extensions.sketchup.com/en>

Author's Background



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A staff member at the Center for Teaching Excellence and Innovation, Reid provides training on a variety of programs, aids in educational resources development, and shares expertise on information and graphic design with faculty at the Homewood campus. He holds a BFA in Illustration and a MA in Digital Arts from Maryland Institute College of Art.