Google's SketchUp Software

and

Individuals with Autism Spectrum Disorders

The Project Spectrum Manual of Ideas

for Teachers and Parents

Written by Anja Kintsch

with support from

The Boulder Valley School District and

The Autism Society of Boulder County

What is SketchUp?

SketchUp software was originally designed for professional architects. It is a deceptively simple, powerful tool for creating, visualizing, and communicating ideas in 3D. SketchUp was developed to combine the elegance and spontaneity of pencil sketching with the speed and flexibility of today's digital media.

Design software has been around for decades and is clearly here to stay. SketchUp is being put to good use by everyone from industry giants creating skyscrapers and football stadiums to elementary school kids using SketchUp to learn about shapes.

It is also being successfully used by individuals with autism spectrum disorders. SketchUp offers individuals an alternative to handwriting when expressing their knowledge, a possible vocational tool, and a way to virtually interact with new and challenging environments before having to face them in person.

What are Autism Spectrum Disorders?

While ranging widely in its severity, autism affects individuals' communication skills and ability to deal with social interactions. People on the spectrum show difficulties in verbal and non-verbal communication, social interactions, and leisure or play activities. They may display repetitive behaviors, show resistance to changes in daily routine, and can have unusual responses to sensory experiences, such as certain sounds or the way an object looks. Symptoms can be mild to severe. Those with autism may also have developmental delays and be non-verbal, while those diagnosed with Asperger's syndrome (or 'high functioning autism') have normal intelligence and are verbal.

Many individuals, even those with "high functioning autism", struggle with the physical task of writing. They may possess a good understanding of the concepts but are unable to express them through traditional linguistic modes. Often they can demonstrate their knowledge by drawing, building or using some other method that does not involve writing. Because of difficulties with social interactions and writing, many individuals with autism spectrum disorders (ASD) are drawn to areas such as mathematics, science and computers.

The Project Spectrum Story

The SketchUp team at Google receives thousands of emails from customers around the world. A couple of years ago, the team noticed that a surprising number of these emails were from parents who were using SketchUp in their professional lives, but who wrote to tell how much their children with autism were using and enjoying SketchUp.

The SketchUp team soon came to understand that people with ASD tend to think and learn visually, and that many autistic children are spatially and visually gifted. Since there was a clear connection between kids on the autism spectrum and SketchUp it seemed natural to explore whether SketchUp could provide these kids a creative outlet or possibly a life skill.   Based on the positive response from the local autism community, Google decided to formalize Project Spectrum in an effort to make

SketchUp and related learning materials more widely available to the ASD community.

The Manual

This manual is designed to help teachers, parents and others working with children with ASD use the SketchUp program in a variety of creative ways. SketchUp can be used as a powerful tool for social explorations and as an alternative to writing to demonstrate knowledge. And because SketchUp is a relatively easy-to-use program, it is a good place for students interested in computer graphics to begin to explore their talents. The manual provides several examples from which one may begin, but the possibilities are limitless.

This manual is a list of exercises that can be done in SketchUp. Additionally, ideas for using these lessons with Google Earth are included in some examples.   For SketchUp tutorials please see http://sketchup.google.com/sptutorials.html.

The Author

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Center for LifeLong Learning and Design (L^{3}D)

The Center for LifeLong Learning and Design (L3D) is an educational and research unit of the Computer Science Department whose mission is the ongoing development of theory and technology to support learning, design, and communication. The Center's approach includes the development of conceptual frameworks and computational artifacts, as well as the cultivation of an understanding of their social and organizational contexts. To this end, the Center conducts research and creates learning opportunities in collaboration with other academic, research, and industrial partners at the University of Colorado, across Colorado, nationally, and internationally, to develop innovative educational models to prepare learners and workers for the challenges of the twenty-first century.

Downloads:

Google SketchUp: http://sketchup.google.com/download.html

Google Earth: http://earth.google.com/

Prerequisite Skills Include

- Must be able to use a 3-button mouse with accuracy.

- Must be able to read and follow simple step by step instructions.

- Must be willing to make mistakes – that's part of the creative process!

Sections

1. Social Explorations

2. Presentation of Knowledge

3. Creativity

Section 1

Social Explorations

Most individuals with ASD have difficulty learning how to engage in the give and take of everyday human interactions. They often have trouble seeing things from another person's perspective and may not realize that others have their own thoughts, feelings, intentions, and points of view. Subtle social cues such as a smile, frown or a groan may hold little meaning. Without the ability to interpret gestures and facial expressions, the social world may seem bewildering, and make predicting what others may say or do in social situations challenging. The unpredictability of the world can be overwhelming and anxiety provoking particularly when in an unfamiliar environment. This can lead to a loss of emotional control or further isolation (NIMH, 2007).

Social stories or scripts are commonly used to aid people with ASD gain an understanding of the thoughts and feelings of others and the social rules that govern our daily interactions. A specific social situation is described in detail and focus is given to a few key points: the important social cues, the events the individual might expect to occur in the situation, the actions and reactions that might be expected, and why. The goal of the story is to increase the individual's understanding and comfort, and possibly suggest some appropriate responses for the situation in question (Polyxo, 2007).

Not only do individuals with ASD tend to dislike having their routines changed, many are anxious of new environments where they are unsure of what to expect. Noises, sounds, and a variety of activities happening at once can be overwhelming. A strategy many teachers and parents have used to help reduce this anxiety is to discuss and show pictures of the new environment they will be visiting. Using SketchUp, individuals can help create and explore the upcoming environment in a more complex and personalized fashion. Students can either use the scenes created by others or develop their own.

Activity 1: Exploring Emotions

Explanation:

Not only is reading the messages that are communicated by physical means (i.e. gestures, and facial expressions) challenging, but knowing why these feelings are being expressed is equally difficult. Direct instruction in this area can be helpful. In this lesson, individuals should identify different facial expressions and pair the events that might cause the different reactions.

Example:

Grandpa and child

Nurse

Standing girl

Further ideas: Comparing and contrasting faces. Match body language to facial expressions.

Activity 2: Going to the Game

Explanation:

High school football games, track meets and other athletic competitions are an important part of many students' lives. However, competitions have rules not only for the players but for the spectators as well. By exploring a football stadium, basketball court or other sporting venue, an individual can learn where they can go (e.g., not on the field or not on the opposing team's side), where the best seats are, where they can find restrooms and concession stands. The can also explore the aspects that may be anxiety provoking such as the bright lights, speakers, or where large crowds gather. This could lead to further discussions about how and when we cheer for the home team.

Advanced

If an individual is interested in sitting close to the basketball hoop, the individual could draw the court and the stands, and then highlight the areas they're not allowed to walk in.

Example:
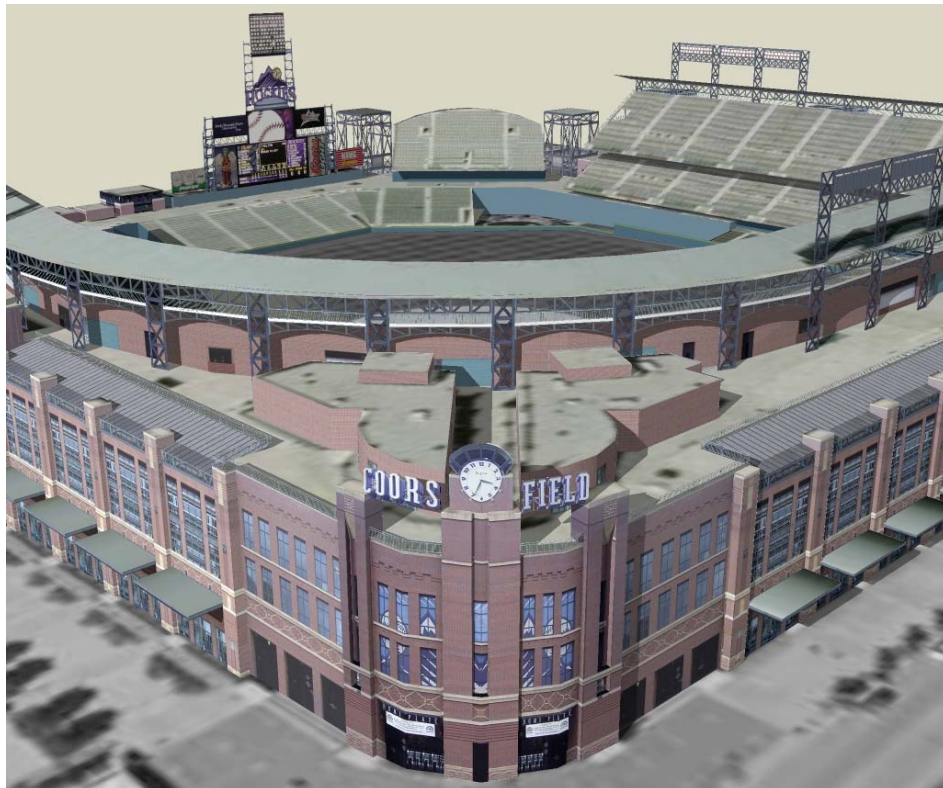
[Coors Field](#)

Further ideas: This can be applied to shopping malls, university campuses, cities, or airports.

Activity 3: Going to the Park

Explanation:

A park or any other public environment can be a challenging place for a person with ASD. People are unaware that an individual with ASD is in the area and what that person's needs might be. Unlike home or the classroom, a parent or teacher is unable to structure the environment. By exploring the area first and developing a landscape of many of the possible activities that could occur, anxiety about the new environment may be reduced. The environment can be used to further discussions about various interactions that may occur such as trying the swings or skateboard park, saying "excuse me" when trying to pass someone on the path, or asking to join in on a basketball game.

Example:

City Park

Further ideas: Recreational center, shopping mall, grocery store, concert hall, amusement park.

Activity 4: Walking to School

Explanation:

Walking to school is a rite of passage for most children and the ability to navigate streets and obey rules of the road is critical. Building, exploring and navigating the path using SketchUp can be a helpful exercise prior to doing so in person. Individuals can display the landmarks that will help them navigate - restaurants, the yellow fence or whatever else they see as important - rather than the standard street sign landmarks. It will allow them to show they know the importance of stop signs and traffic lights, and the ability to recognize the things that can cause them anxiety - the barking dog, the unmarked alley, and so on.

Example:
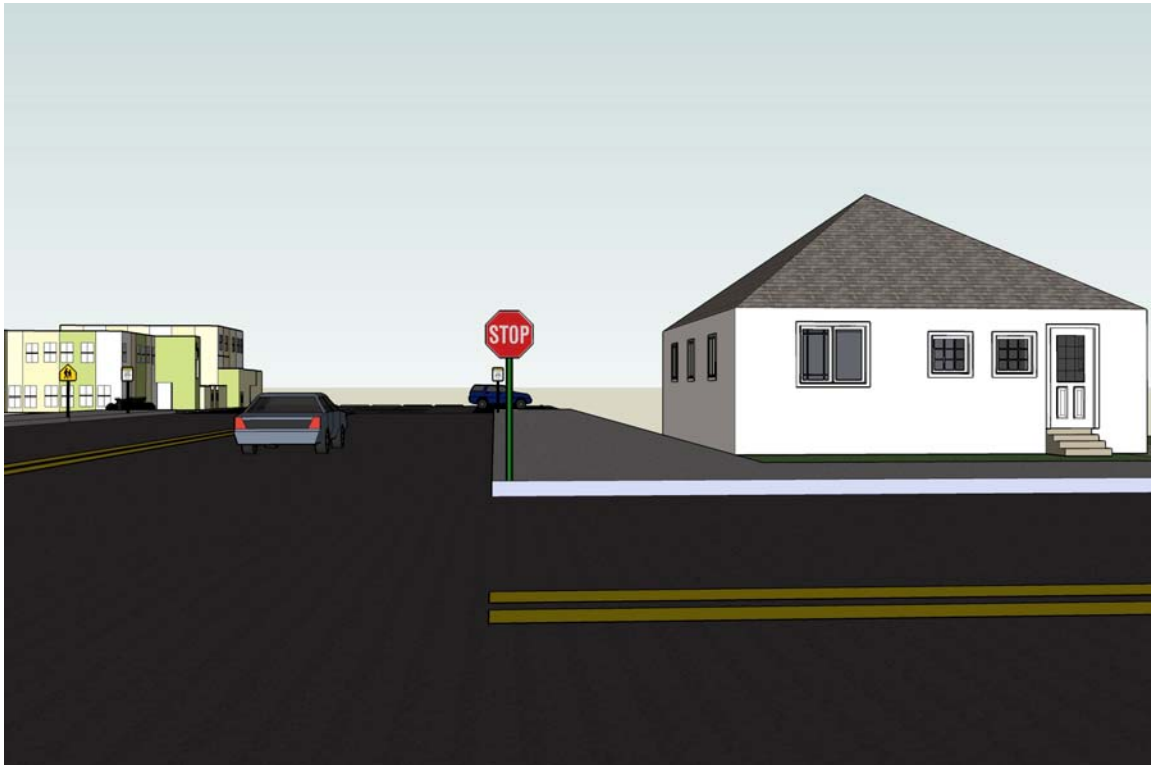
[Walk to school](#)

Further Ideas: This teaching technique could be used just as easily by a student learning to ride a bus independently.

Advanced 🌐
Instead of constructing the route oneself, one could explore it using Google Earth's imagery. Important landmarks not depicted in Google Earth can be developed with SketchUp and imported into Google Earth.

# Section 2

Presentation of Knowledge

For many individuals with ASD the struggle to express themselves verbally transfers to a difficulty expressing their ideas on paper. Despite in-depth understanding of a topic, some are not able to write about it. Alternatives to writing such as diagrams, models, and digital presentations can be powerful methods to express this knowledge.

Activity 1: Historical Scene

Explanation:

In history courses students are often required to write essays on the culture and daily lives of people around the world, major turning points in history, or significant battles. Google's 3D Warehouse has many famous buildings and other architectural monuments (e.g., the pyramids of Egypt) as well as artifacts of daily living already available.

Example:
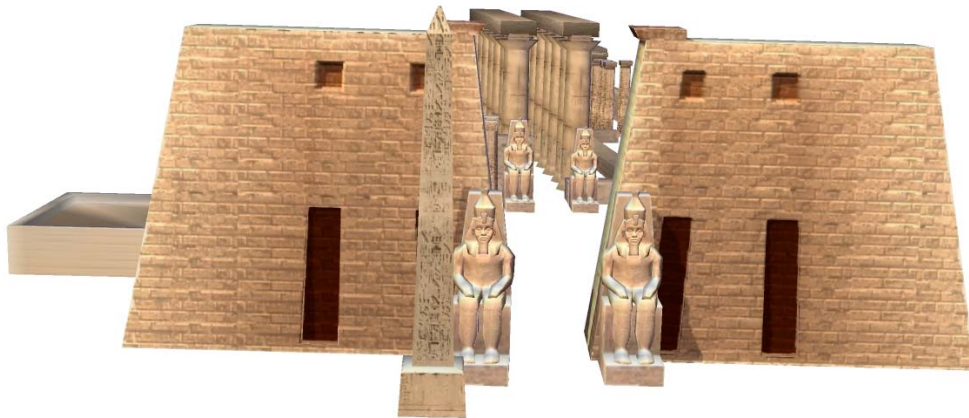
Luxor Temple
Wonders of Ancient Egypt

Further Ideas: The Invasion of Normandy, the Boston Tea Party, Ancient Greece or Rome, Seven Wonders of the Ancient World

Advanced

These depictions can be imported into the correct geographical regions in Google Earth.

Activity 2: Going Inside the Story

Explanation:

Traditionally, students are asked to show their understanding of a narrative through essays. For example, they may be asked to compare and contrast two characters or books. Understanding can also be shown through a comprehensive depiction of the environment in which the characters lived. This method of knowledge depiction lends itself better to books with limited environments or in a place where the layout of a building is of particular importance.

Example: Harry Potter

Here is a wonderful model of the Hogwarts school from the popular Harry Potter series. This and literature-related models can be found in the Google 3D Warehouse.
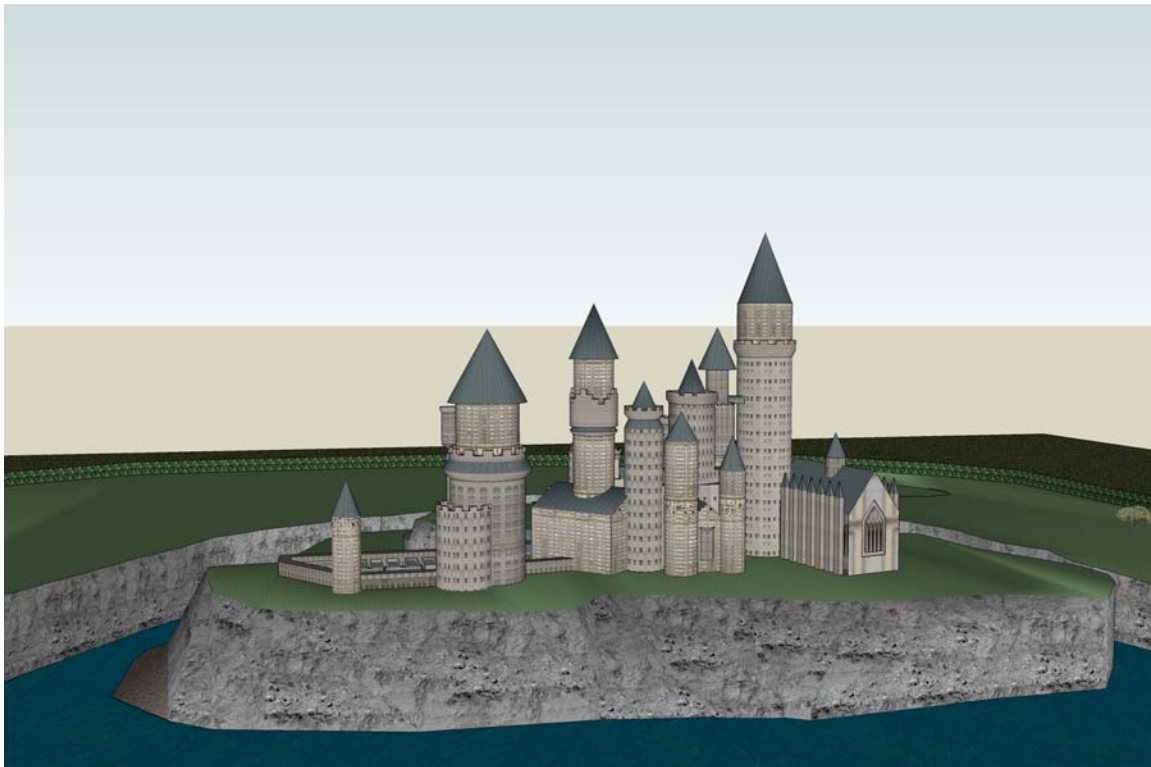

[Hogwarts Model](#)

Advanced

Using Google Earth software you can have students map the paths of the characters in *Around the World in Eighty Days* by Jules Verne, *The Odyssey* by Homer, and many other adventurous books.

Activity 3: Understanding the Seasons

Explanation:

SketchUp can be useful in the exploration of somewhat abstract concepts such as seasons. One way to study the effect of seasons is to show how an environment changes during the course of a year. Students can compare changes in deciduous versus coniferous trees, colors, and weather.

Example:
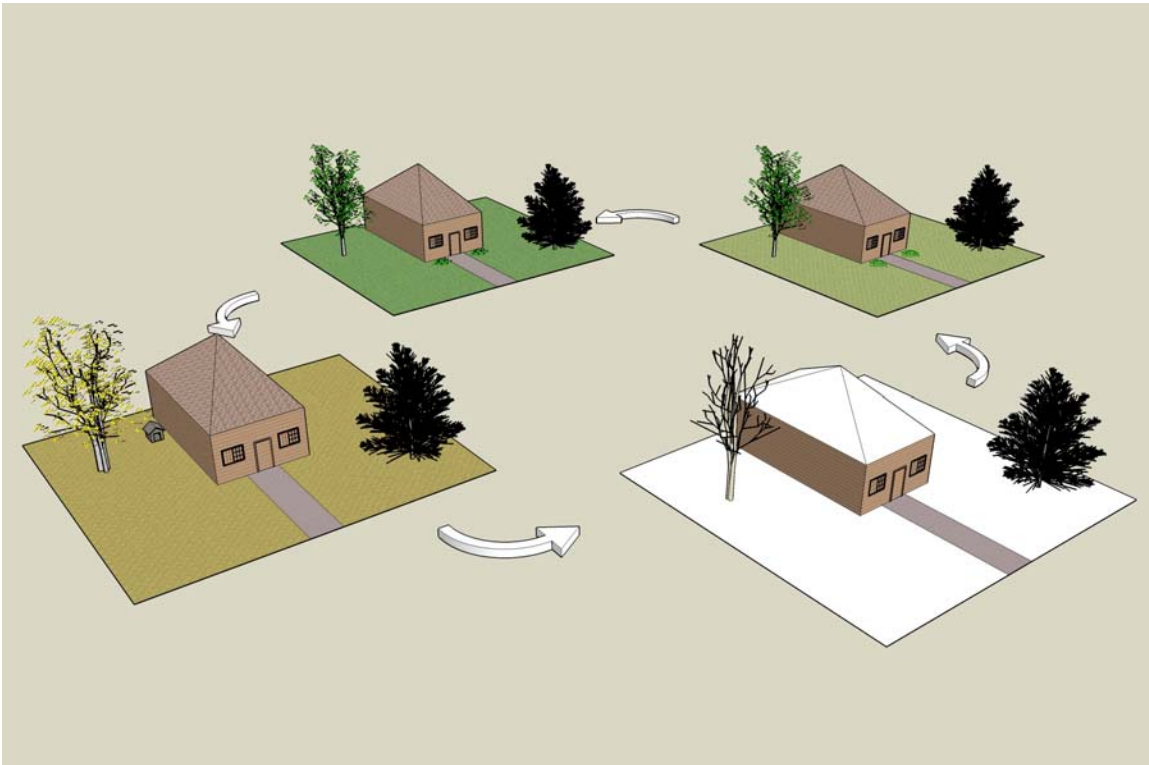
[Seasons](#)

Further Ideas: Times of the day, suburban vs. urban areas, or climate zones (E.g., desert vs. jungle)

Activity 4: The Water Cycle

Explanation:

A typical area of study in third and fourth grade, and then again in sixth and seventh, is the water cycle, or condensation, precipitation, and evaporation. Younger students are often asked to draw pictures of the cycle while older students write essays and take tests to demonstrate understanding. SketchUp can be used to visually demonstrate one's understanding of the concept.

Example:
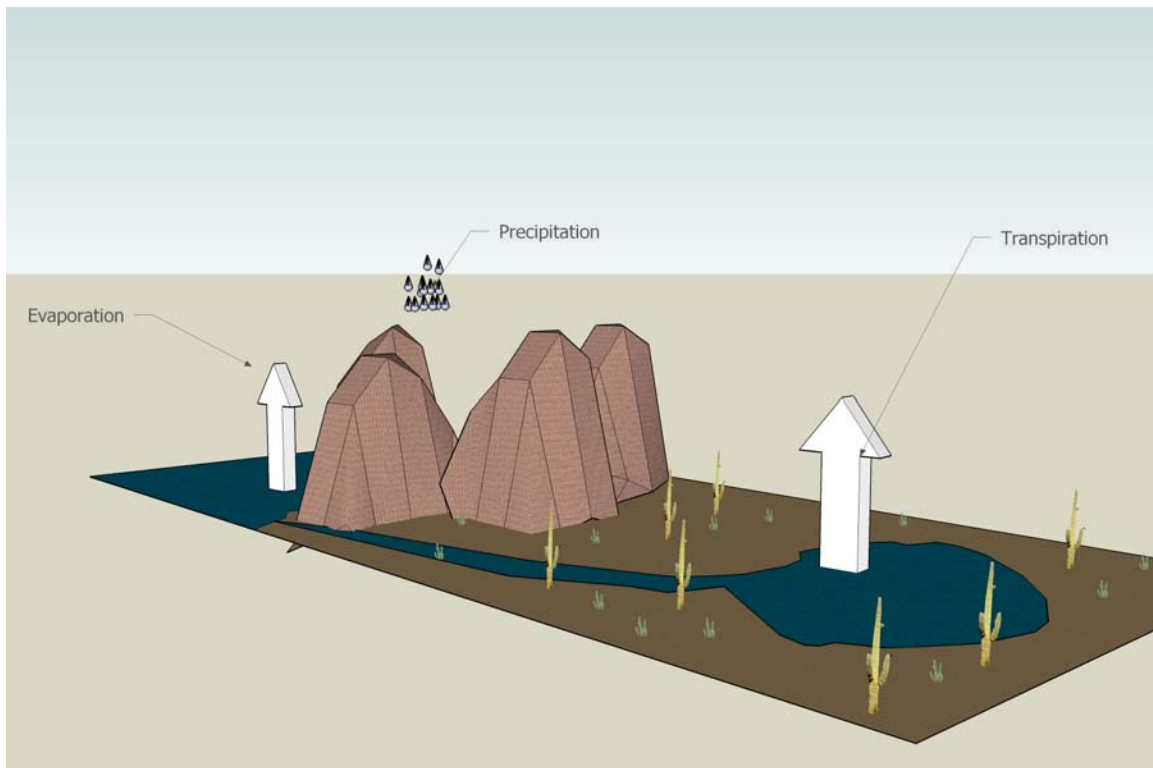
Water Cycle

Further Ideas: The solar system, concepts of gravity, environmental habitats

Section 3

Creativity

Explanation:

Finding a vocation in which one can be truly successful can be challenging for anyone, but particularly for someone with an ASD. While some do establish rewarding careers, often in computers, mathematics or science, too often intelligent individuals with ASD find themselves unchallenged by common jobs. Given a tool like SketchUp, some individuals may be able to find a life skill that can lead to meaningful employment in the architecture, gaming, or computer graphics fields. SketchUp can also be a starting point for learning other 3D and animation programs. Other individuals who struggle with social interactions may simply find SketchUp an enjoyable way to express their creativity.

Often the best way to see if someone is interested or skilled at a specific kind of vocation is to let them explore it on their own terms. SketchUp offers a world of possibility when it comes to creativity. Wouldn't anyone find it fun to create their own house or world?

Activity 1: Dream Spaces – a room, a home

Explanation:

Because SketchUp was originally designed for architects, using it to build your own home (or if you wish to start out simpler – your own room) is a great way to learn the application. As individuals become more proficient with the software their spaces will become more intricate and extraordinary.
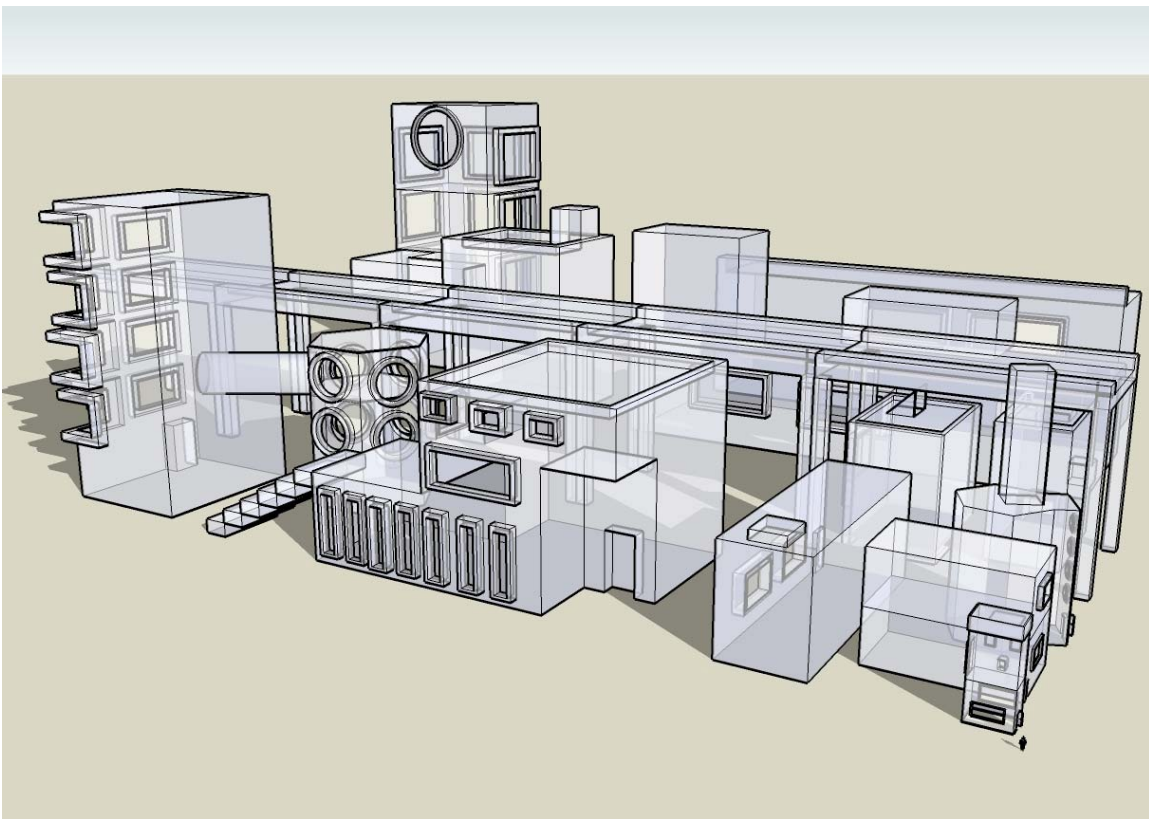
Example:
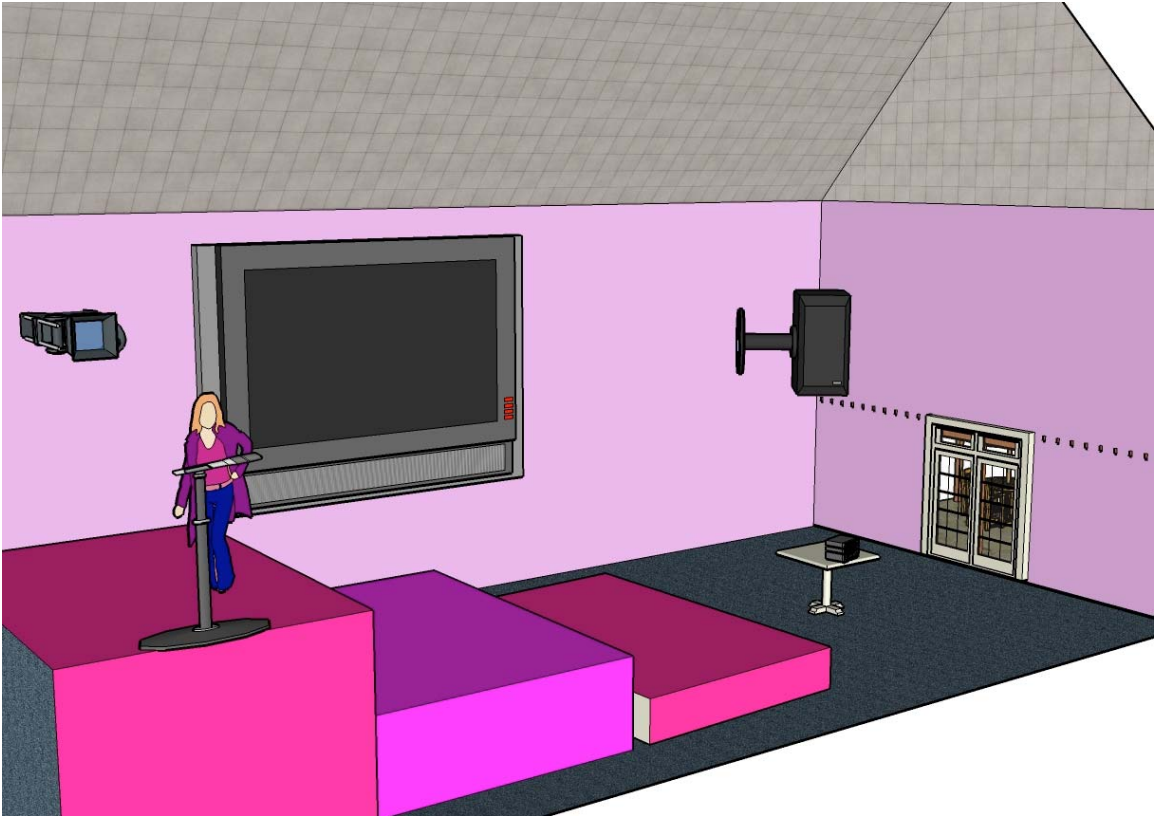
Dream Room

Further Ideas: Movie set, amusement park, concert stage

Activity 2: Dream World

Explanation:

Game developers expend an extraordinary amount of energy developing new game environments. They may be realistic, futuristic, or fantasy based. Not only are they fun for many young adults to play, they can be just as fun to create. Already used by professional game designers, SketchUp is a real world way to begin this creative process.
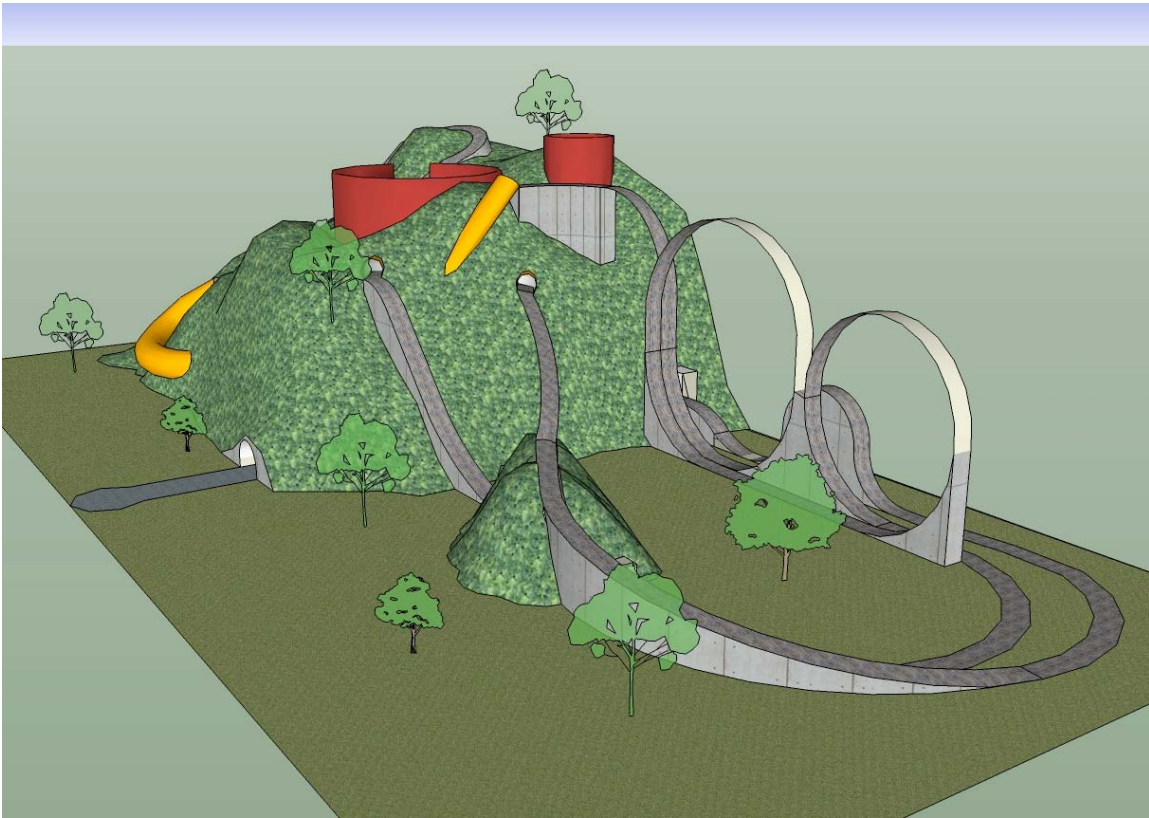
Example:

Game Environment

Activity 3: Beyond Buildings

Explanation:

Certain structures require remarkable spatial abilities to design. If you are working with someone with this gift, building a rollercoaster can be a fun challenge.

Example:

[Rollercoaster](#)

Further Ideas: hanging bridge, labyrinth

References

National Institute of Mental Health - http://www.nimh.nih.gov/publicat/autism.cfm

Polyxo.com - http://www.polyxo.com/socialstories/introduction.html

Autism Society of America - http://www.autism-society.org/site/PageServer

Google 3D Warehouse – http://sketchup.google.com/3dwarehouse