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Using VR & Art in Game Design

Project: Virtual Reality + Art for Game Design

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Sample Florida Common Core/CTE Standards

CTE Standards

27.0
Create a working game or simulation as part of a team. The student will be able to:
27.01 Create a storyboard describing the essential elements, plot, flow, and functions of the game

27.02 Create a design specification document to include interface and delivery choices, rules of play, navigation, functionality, scoring,
Media choices, start and end of game, special features, and development team credits.

27.03 Using a simple game development tool, create a game or simulation

ISTE Standards for Students

Empowered Learner-Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their
learning goals, informed by the learning sciences.
Knowledge Constructor-Students critically curate a variety of resources using digital tools to construct knowledge, produce creative
artifacts and make meaningful learning experiences for themselves and others
Innovative Designer- Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
Computational Thinker- Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
Creative Communicator-Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

Goals & Objectives

I wanted to have a project that introduced game design to younger students and got them excited about technology and
computer science. A service-learning project where high school students can teach younger students about story telling using
art and virtual reality. This project introduces game design using virtual reality and art.

Objectives

- Students will gain an understanding of basic character design using art and virtual reality (Oculus Quest)

- Students will learn how to use virtual reality devices

- Students will learn to understand the relationship between art and gaming and establish connections of STEAM (Science, **Technology**, Engineering, **Art,** and Math)

- Students will learn create 3d shapes in virtual reality

Project Overview

Students will have an opportunity to learn about game design using character design in 2d and then transfer that design 3D shapes in virtual reality using Tilt Brush app.

There are 5 sessions in this lesson plan. Each session builds knowledge towards the next session. This project was meant for a service-learning project where my high school students can be involved in community service getting younger kids excited about computer science. The course overview is to introduce game design using Virtual Reality and Art. To give students an understanding of basic character design using Art and Virtual Reality. Giving the students a chance to understand the relationship between art and game design. The four sessions are:

Session 1: Introduction to Character Design

Session 2: Key Concepts of Character Design

Session 3- Story and Game Creation using Character

Session 4 – Game Environment – Lesson in Background/Environmental Art

Session 5- Introduction to Virtual Reality. Moving from 2d to 3d

Step-By-Step Lesson Plan/Guide (For Teachers)

Session 1: Introduction to Character Design

What the attendees will learn – Attendees will learn the basic elements of game design and art. They will play games in Session one with and explore game characters in each game

Attendees will be asked to play games using VR units and tablets and answer questions after time in each game

Procedures: Students will be instructed to play several games the first day. Guided questions will be explained so the students know what to observe during fun game play. The objective of this exercise is help students get inspired

List of Games on tablets and Oculus Quest

Tablets: Among US, Sonic Dash, New Super Adventure, Subway Surfer, Crossy Road, Temple Run, Angry Bird, Fruit ninja (This game is good to observe game mechanics in user experience, less character design in this game)

Oculus Quest: Angry Bird, Acorn: Acron: Attack of the Squirrels (requires more than one player)

Questions to discuss before game play

1. What are the rules of the game you played?
2. How do the characters move in the game? (Jump, run, special movement of different characters in game?
3. Are there any special shapes that make up characters in game?
4. What are the characters abilities?
5. What accessories do the characters have? (I purposely replaced the word weapon with accessories)
6. How do the characters in games make games cool to play?

These questions will be discussed in beginning and again after some game play. The goal is for the kids to have fun but with a purpose

After discussion students will be introduced to Character Design:

Character Design:

i. Introduce what Character Design is

i. Kid Editon Definition "Character Design is the whole process of making concepts, choosing the style, and creating the art of the character" Compare Mario and Sonic, both are remembered for their unique character design: Mario for his red motif and moustache, and Sonic for his distinctive silhouette and blue accents. Or if kids don't know how those characters, bring up the characters from Among Us: Their simple design is what makes them the memorable.

ii. **Creating the Characters**

1. When helping them create characters, this will take up most of their time. To help them out, we will choose a game art that they like the most and base it off on that (they don't have to follow this rule, but it will help them start off) This is only the draft of their character design.
2. After the exercise, explain how people who work in Character Design must go through several cycles of creating a character.
3. The next activity is now of memory: the kids now have to draw their character from memory! This exercise will help them simplify their character as some of the best character designs are the ones that are the most simplified. For now, that will if the last process of drawing the character

iii. **Creating Personality for Characters**

.Mostly a boring process for the kids, they now must jot down the three big traits for their characters to see what their place in the story is.

*i.*Now the next activity is that they must draw their character with the character of the person next to them. This is mostly for fun, but it'll help them interact more with their peers.

Session 2: Key Concepts of Character Design

What the attendees will learn - The key concepts of character design and how basic shapes can be used to create your own character
Attendees will start process of creating characters and learning how important shapes are in the process

Procedures: In session 2, students will explore key concepts of character design after looking at how shapes are used to create characters. The goal to for them to start designing their own characters based on lessons learned.

Teachers begin by using sketch books and showing students how basic shapes are used to create characters and design. In the elementary level this is a great opportunity to discuss shapes and show students how using basic shapes can create more detailed characters.

1. Using Drawing Shape by Shape by Chris Hart, students follow the instructions and draw out cartoon characters in book. This resource is used because of simplicity and fun students have. Another objective is using materials that are accessible for all students in the group.
2. The three main shapes discussed are the circle, triangle, and square
3. After 15 minutes of drawing basic shapes, students are introduced to the vocabulary of character design
4. Students are introduced to Bloxels Edu where students can create characters and worlds to create their own game. Bloxels is a simple yet powerful way to create characters, art, and stories to share with the world. Works on iOS, Android, Kindle, or the Web.

5. Students will use the Bloxels gameboard and re-create the characters they created on paper to the pixel gameboard and then using the app use a tablet or computer and transfer design and save to be used in later sessions. This is a good place to start a discussion with students where they share the characters they drew and any characteristics they thought of
6. In the next session students will start building a set of characters of their own and start thinking about a story to their game

Lesson in the Importance of Shapes

Importance of Shapes:

When designing a character for a show, game, or comic book: most character designers use the traditional three main shapes (or mostly called Shape Language) to show how the character is without the use of emotions.

The three main shapes in character design:

Circle:

When using circles, they convey that the character is *kind, soft, weak.* They can also give a warm, welcoming feeling.

Triangle:

When using triangles, they have a sharp edge to them that can create a feeling of fear and danger. Or if using the shape correctly, can make them feel energetic, fast, or allude to its strength, either intellectual or muscular.

Square:

When using triangles, this shape is used more to define the character as stable or firm. You can feel more power and prowess from this type of character.

Examples of the use of Shape Language:

Key Concepts of Character Design:

The lesson needs to have examples of what good character designs look like:

Talk about the three key components of Character Design:

1. ***Silhouette:*** Having a strong silhouette allows people to recognize the character alongside other characters, having different shapes will help with that. This will help your character to become easier to recognize from a distance.

2. ***Palette:*** Having a simple color palette for your character will help it be more recognizable, being able to tell who they character is by colors alone is a sign of a strong character design. Using too many colors on your character can create a muddy affect and your eyes won't be able to focus on thing. It's best to keep a limited number of colors in your design, about 3 or 4 colors will do the trick.

Exaggeration: This one ties into Silhouette. Cartoons or games usually don't stay with real life

anatomy and so should you! Exaggerating different places of the body and affect the way the character is seen. If you make their body thin, they'll seem fragile and weak but, if you expand their shoulders, they'll seem firm and confident.

Session 3- Story and Game Creation using Characters

What the attendees will learn how to start building a story from scratch.
Character development and adding personality traits
Attendees will learn how to use computer and create a basic story board using Canva
Attendees will start learning the different concepts of storytelling in relation to game design. It will be a simplified version that is kid friendly

Procedures: During session three the students will explore the concepts of storytelling and start creating their own stories using characters they create. Students will use storyboards to create a visual sequence of story development and game play.
Focus on adding personality and movement will be discussed in this session.

Teachers will begin by outlining key concepts in storytelling. Depending on grade level, teachers will spend more time going through outline in sections. This can be done as a group activity to help students get started

1. What is a story?
   Start a discussion about how games have a story to them and what goals are in different games. Ask students what their favorite games are and ask them to describe what story they think each game had in their own words

2. Storyline – Have students think about what type of story they would like to create? This activity is good because students find out about their other ideas and the creativity from the discussion is a good starting point
3. Characters – Use this video for a quick intro to characters https://www.youtube.com/watch?v=LhOBuYQJPEY
   Have students write in their sketch book emotions they would like their characters to portray – happy, silly, proud, excited
4. Introduce adjectives to students about their characters. Ask students what their characters will be doing using action adjectives. Will they run, jump, count, sprint
5. Character movement – Have students think about how their characters will move. This concept brings the importance of shapes into the mix. Certain shapes allow different kind of movements.
6. Obstacles and goals – What are the main goals of a story? Are there any obstacles? These two questions are important to discuss with students.
7. Storyboard – Talk about the definition of storyboard to students. Advise students that this process is very important. This will be a process of design and redesign. This is the perfect time to discuss the Game Design Process.
8. Game Design Process – Imagine, Design, Create, Test, Improve

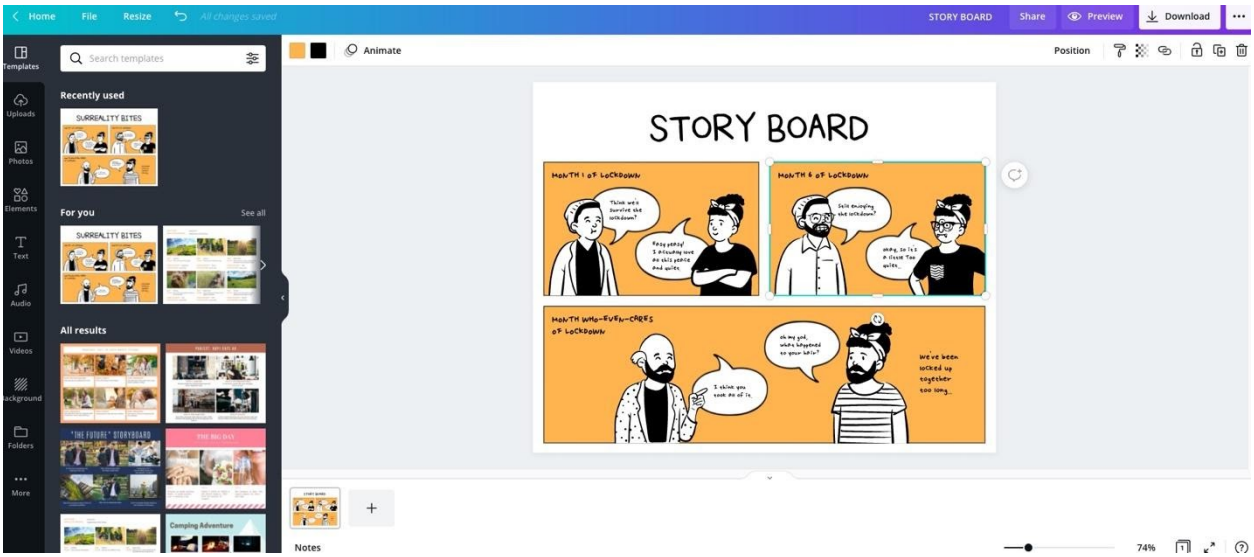
This is a simplified version of the game design process to make it easier for younger students to process. Draw it out with students together and explain how important each piece is and how you can end up at step one again after testing your game. Improvement is key.

9. Storyboard creation - A good tool that can used for story board is Canva. Educators can get a free account using Canva for Education https://www.canva.com/education/

With the younger students, I created accounts that can be used in groups.

Students will Create a storyboard that visually communicates their short story. Sketch out the scenes, characters, and major objects. From sketch-to-sketch, they will include scenes, actions and transitions that detail the flow of the story.

Teachers can also use this resource for storyboard https://www.educationworld.com/tools_templates/template_strybrd_8panels.doc



1. This session will take longer. In afterschool scenario it will take two weeks.

Session 4 – Game Environment – Lesson in Background/Environmental Art

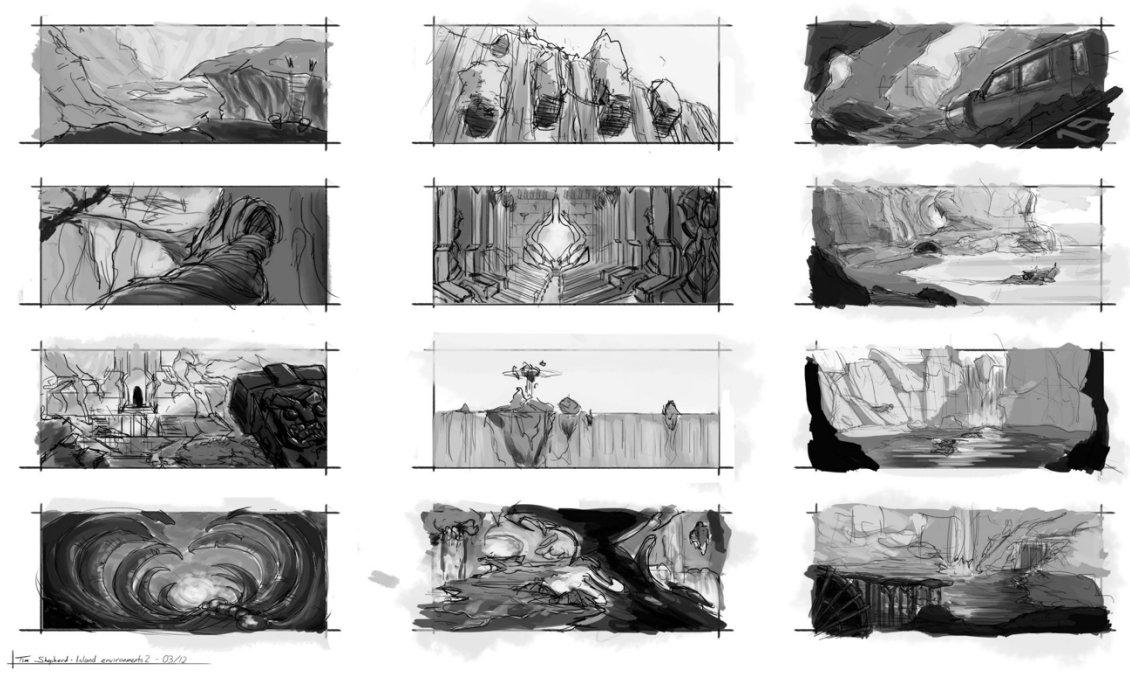
What the attendees will learn the basics of building an environment.
Attendees will learn the importance of environment in game design

Procedures: Students will start the process of creating their own game environment. In this session a mini lesson in background and environmental art is included. The importance of this session is to stress how the environment plays a key part in game design. It makes a story vibrant and adds life to every game. The outline for this session is the key components of the game environment the students create.

1. **What is the name of the place you will create?**
2. **Where does the story take place? Inside or outside?**
3. **Is it hot or cold?**
4. **Lighting – Is it a dark or bright place?**
5. **What are the hazards in your environment?**
6. **What is the environment composed of – Trees, Lakes, Grass**
7. **Discuss what background and environmental art is**

What is Background/Environmental Art?

Environmental design is the process of creating a world, or *environment*, for the story/characters you created. This process is important for the entirety of your world, it creates the mood, limitations, and time for your world for the characters that you created.



Fundamentals of Environmental Art:

Research and Reference:

Before picking up your pencil, it's highly recommended to first look for references and research on the environment you already have in your head. Studying on how an environment can warp, the limitations of the certain environment you chose and the different kinds of moods your environment can create.

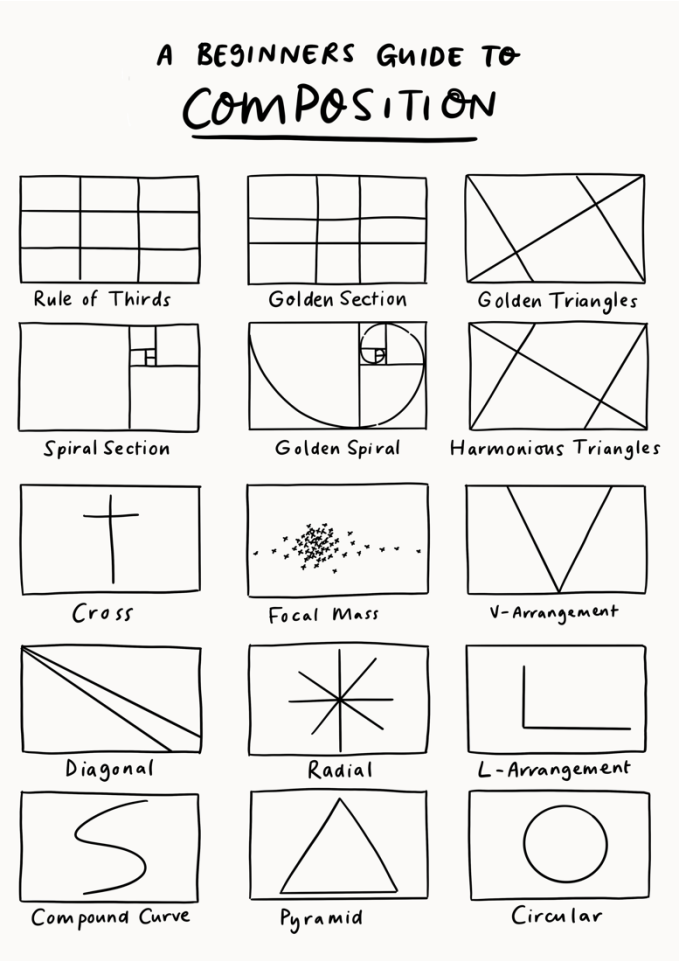
Sketch and Outline:

After you complied or reference, you can start sketching on what you've complied with. The references will be a guide to you are looking for. Having 3-4 different sketches will help you find what you're really looking for. After each design, start picking out what works best for your world and what doesn't. You can start to compile what all the traits of the environment and create your final sketch with what you ended with.

Composition and Shapes:

After you create your final sketch, then creating a composition, or the arrangement of parts in an art, for the background you created to create different moods for the story. Having the composition from the point of view on the ground can create a dramatic or important scene; or having an overshot scene can establish where your characters are

1. Example of different Compositions:



Value, Lighting and Rendering:

Adding color and lighting is one of the biggest factors to setting the mood and tone to your composition piece in your environmental art. Using warm toner can create either an energetic mood or dramatic scene; while a cooler tone can create an ominous, mysterious tone or a calm and relaxing scene.

1. Examples using color and lighting:

In this session Bloxels Edu will be used to create Game environment after students spend some time creating their designs on paper. Bloxels has a simple Background builder that requires no code. The Background builder includes several asset packs including different worlds that the students can remix. I suggest the students build from scratch first and use their own creativity. After project they can go back and use different asset packs. Below are links that will help teachers navigate Bloxel site for students.

https://eugene.libguides.com/ld.php?content_id=42473813

http://www.bloxelsbuilder.com/tutorials

Before students are asked to create their worlds in computer or tablet, students can use the Bloxel gameboard and start the process of environment creation. Remind students about the game design process. This process is fun for students.

After 45 minutes, have students share their environments to everyone and have students continue working on story boards adding the environments they just created.

Session 5- Introduction to Virtual Reality. Moving from 2d to 3d

What the attendees will learn about virtual reality
Attendees will learn how to draw in 3D from memory. Attendees will learn basic drawing tool in Tilt brush to recreate character art

Procedures: In session 5 students will transition from 2d to 3d using virtual reality. It is important to spend time explaining to students what virtual reality is. These are short videos teachers can use for an intro into virtual reality

https://time.com/3986185/virtual-reality-headset/

Videos to introduce difference between virtual reality, augmented and mixed reality

https://edu.gcfglobal.org/en/thenow/understanding-virtual-reality-and-augmented-reality/1/

https://youtu.be/GbpqwUUfMAQ

https://learn.g2.com/mixed-reality

VR Safety Rules to watch

https://www.youtube.com/watch?v=Ke4MefpmRmc

https://www.youtube.com/watch?v=zh5ldprM5Mg

Tilt brush video to watch before activity

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

Tilt brush will be used for this session. Before you start activity, about 15 minutes will be spent getting the students used to the Tilt brush tool and gestures. Focus on teaching the basic movements and having students just use the brush tool for this next activity. I included a Tilt brush PDF including instructions and videos.

Students will choose one of the characters they made. Have students choose one character they made and spend 5 minutes looking at it and focusing on every shape and line there is in the character. Advise students that they will memory to create the same character in VR.

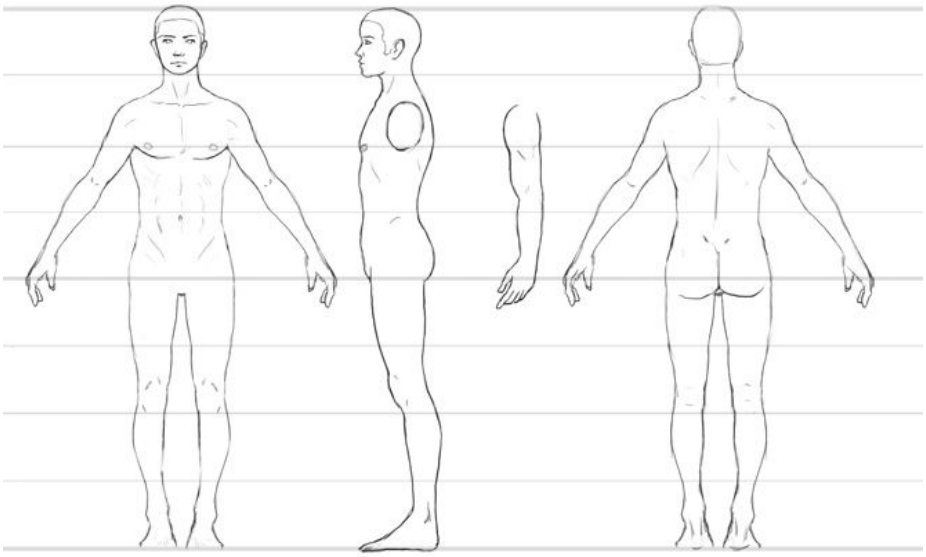
After 5 minutes have students put on the Oculus VR set and begin creating. You can save sketches in Tilt brush using the save icon, but this activity is just meant to be fun and to get students used to using the tool. For younger students it is recommended to use Paint VR

because it is easier to use. Paint VR is used with the Oculus Go units that have been discontinued. I just add this resource for any teacher that might have older unit.

<u>What is Virtual Reality?</u>

Virtual Reality (*VR*) is a simulated experience that can be similar to or completely different from the real world.

When experimenting with *VR,* I used the app *Tilt Brush by Google* to practice creating characters in a 3-Dimensonal use. In the beginning, there was a lot of trial and error; exploring through each brush to see what fit best. Its best when starting out to play around with the brushes, the sizing of your scale, and how to use the 3D plane.



A useful tool to use before creating your character in a 3D space is a turnaround model sheet.

Animators, when creating their characters, use a turnaround model sheet to help them stay on-model as they draw characters from different angles and in varying poses.

The turnaround sheet can be transferred into the 3D plane when trying to make your character in VR. Having to understand the basic shapes that make up anatomy [ex. Circle for a head, triangles for feet] will be able to help guide you in transferring 2D to 3D by hand.

Websites/Learning Ideas/Resources

Tilt Brush Resources and Guide
https://docs.google.com/document/d/1HRPgPVYP5-bxUsoFcrg71qq2SFdgYAO8Hb80TB1sVV0/edit?usp=sharing

Vocabulary List Link
https://docs.google.com/document/d/1mN50dN3cNwHZ33ET5KXHlpWPUw4hp98x/edit?usp=sharing&ouid=113588529411193540964&rtpof=true&sd=true

Oculus Website

https://www.oculus.com/

Canva for Education

https://www.canva.com/education/

Bloxels

https://edu.bloxelsbuilder.com/

Storytelling through Coding Grant 2021

https://www.youtube.com/watch?v=FUKOvFBTJ3U

https://elementari.com/img/website/grant.pdf

Email nicole.li@elementari.com if you need any support.