Lesson Plan Title: 3D printed puzzle Length: 6 hours

**Note:** Before you plan and write art experiences; pre-assess your students based on the proposed concepts, enduring understandings, and objectives of the unit/lesson(s). You may also gather this information from (previous) teachers, by reviewing already completed art work, consulting curriculum materials, etc., to get a better understanding of what content students already know *and* what they willneed to know to be successful.

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| **Pre-Assessment:**  ***This will need to be done prior to teaching your lesson.*** Outline the method you will use to determine the skill/knowledge level of your students based on the concepts/enduring understandings/objectives of the lesson. (Hint: turn these into questions.) Be specific in describing what you would recognize as proficient skill/knowledge. |
| What is 3D printing?  What can we make with it?  What does the box menu let you do?  What is gumball and what does it let you do?  How do you combine and subtract shapes from each other?  What does changing perspective do?  How do you change the surface of your shape? solid? wire? ghosted?  How does 3D printing affect art?  Getting to know you worksheet   1. How can your teacher help you to be successful? 2. In there anything in particular you want me to know about you? 3. What is your concentration   Pre-motivation assessment activity   1. How would incorporate 3D printing into a project in your concentration? 2. Why is collaboration important? What does it teach us? 3. How does it affect works of art? What are advantages of collaboration in art? 4. How can building skills in other content impact how you create art? |

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| **Performance:**  **What will students accomplish as a result of this lesson?** This can be presented to students in the form of a story. In this narrative the students take on a role and create a learning product about a specific topic for a certain audience. (RAFT – Role / Audience / Format / Topic) |
| Role: Artist  Audience: Classmate  Format: digital fabrication  Topic:3D printing a puzzle  You the artist are creating a puzzle piece on the 3D printing program called Rhino in order to complete your piece you must interact with other classmates to find ways to make your pieces fit together. You will learn basic tools and techniques on rhino and how to upload designs onto a 3D printer and print them. |

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| **Concepts:**  List the **big ideas** students will be introduced to in the lesson. These ideas are universal, timeless and transferrable. Examples of concepts used in art might include: Composition, Patterns, Technique, Rhythm, Paradox, Influence, Style, Force, Culture, Space/Time/Energy, Line, Law/Rules, Value, Expressions, Emotions, Tradition, Symbol, Movement, Shape, Improvisation, and Observation **Look for concepts in the standards, content specific curriculum, etc.** |
| Collaboration, style, composition, techniques, shape, observation, process, product |

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| **Enduring Understanding (s):**  Enduring Understandings **show a relationship between two or more concepts**; connected with an active verb. The best enduring understandings not only link two or more concepts; but demonstrate why this relationship is important. Like concepts, they are timeless, transferrable and universal. |
| Artists can use communication and stylistic choices to make collaborative works of art  Art making can apply to and used in many different content areas  Artist use 21st century skills and technologies to produce works of art |

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| **Standards: (All lessons should address all standards.)**  1. Observe and Learn to **Comprehend**  2.Envision and Critique to **Reflect**  3. Invent and Discover to **Create**  4. Relate and Connect to **Transfer** |

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| **Objectives/Outcomes/Learning Targets:**  Objectives **describe a learning experience** with a **condition → behavior (measurable) → criterion.** Aligned to: Bloom’s – Standards – GLEs - Art learning and, when appropriate, Numeracy, Literacy and Technology. **Should be written as:** Objective. (Bloom’s: \_\_\_\_\_ - Standard: \_\_\_\_\_ - GLE: \_\_\_\_\_ -Art learning: \_\_\_\_\_ -Numeracy, Literacy, and/or Technology) |
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| *1.* Provided information, SWBAT to design a 3D puzzle piece transferring ideation from their model for their final product onto Rhino. *Blooms: apply, Standard: Transfer, GLE: art is a lifelong endeavor, Art Learning: Ideation, Literacy: reading names of tools and identifying which ones they are, communicating with each other, listening*  2. Given instruction, SWBAT construct an individual puzzle piece by successfully applying the basic tools in Rhino. *Blooms: create, Standard: create, GLE: Assess and produce art with various materials and methods, Art Learning: Materials, tools and techniques, Literacy: Listening to instruction, reading and identifying tools by name, vocabulary*  3. Using prior knowledge about process, product and function, SWBAT create a square and three spheres using specific dimensions, subtract four times from their square, discuss designs with classmate, use elements design ( space, shape/form, line) and upload at least one thing to the share in the “shared parts folder”. *Blooms: analyze, standard: create, GLE: Demonstrate competency in a traditional and new art media, and apply appropriate and available technology for the expression of ideas,*  *Art Learning: Learning to use materials, tools and techniques, Literacy: discussion, reading, vocabulary and listening*  4.After projects have been printed SWBAT modify individualize puzzle pieces by sanding, using plastic primer and paint and then assemble puzzle pieces in various ways that express form and function as intent. Blooms: create, create, GLE: *Demonstrate competency in a traditional and new art media, and apply appropriate and available technology for the expression of ideas, Art Learning: Expressive features and characteristics of art, Literacy: knowing/recognizing vocabulary, listening*    5. After showing examples of art used for function with the use of new technologies and discussing the history, contemporary artists, new innovations, and impacts 3D printing has created for the art world SWBAT identify the importance, problems, possibilities and technological advancements in art. *Blooms: understand, Standard: comprehend, GLE: Art and design have purpose and function, Art Learning: Art history and culture, Literacy: discussion, listening, reflecting*  6.Using completed puzzle and pieces, SWBAT to express individual intent and introspect their experience, process, product, failures, problems, successes and frustrations and real world connections/applications. *Bloom’s: evaluate, Standard: reflect, GLE: Reflective strategies are used to understand the creative process, Art Learning: Critical Reflection, Literacy: discussion, reflection, vocabulary, listening* |
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| **Differentiation:**  Explain specifically how you have addressed the needs of exceptional students at both end of the skill and cognitive scale. Describe the strategies you will use for students who are already proficient and need growth beyond what you have planned for the rest of the class, as well as modifications for students with physical and/or cognitive challenges. **Students must still meet the objectives**. |

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| **Differentiation:**  (Multiple means for students to access content and multiple modes for student to express understanding.) | **Access** (Resources and/or Process) | **Expression** (Products and/or Performance) |
| resources: blog  handouts  videos  links  tutorials  Rhino manual  Help menu on Rhino  teacher  other classmates  A demo will also be provided, after each step is shown the student will repeat it on their computers to check for understanding. | An understanding of how the program works and producing puzzle piece that shows relief techniques and artist's unique style. |
| **Extensions for depth and complexity:** | **Access** (Resources and/or Process) | **Expression** (Products and/or Performance) |
| Students use each other, rhino, handouts, videos, manual, 3D model and teacher to make a puzzle piece on rhino. Collaborating with other students and using their design ideas, while also keeping their individual artistic intent in mind. | Puzzle pieces are created according to the consumers requirements that they must fit together. After being printed students add their a piece of themselves to their individual puzzle piece and put them all together to make a whole in various ways. |

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| **Literacy:**  List terms (vocabulary) specific to the topic that students will be introduced to in the lesson **and describe how literacy is integrated into the lesson.** |
| During the PowerPoint students will be discussing and reading information provided. They will be communicating and collaborating with classmates, making connections to other content areas, asking questions and reading instructions.  Rhino  CAD  3D printing  process  product  perspective  modeling  line  shape  collaboration  color  composition  balance  proportion |

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| **Materials:**  Must be grade level appropriate. **List** everything you will need for this lesson, including art supplies and tools. (These are the materials students will use.) **List all materials in a bulleted format.** |
| computer  sketchbooks  examples  clay  acrylic paint  sharpies  watercolor paints  top coat  sand paper/file  exacto knives |

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| Resources:List all visual aids and reference material (books, slides, posters, etc. Be specific; include title, artist, etc. Make reference to where the material can be found. (These are the resources used by the teacher to support/develop the lesson.) List all resources in a bulleted format. |
| * Students will be provided with tutorials and tools on my blog * The help menu on rhino is available to students at all times and provides detailed instructions, resources and videos. * The rhino manual * I will provide help to any students who needs it * other students in the class * My 3D printed puzzle piece and design * The shared parts and designs folder created through Rhino * Instructions handout provided on my blog and handed out. Will include tools (images and names) and their functions, instructions for uploading files, printing and requirements (dimensions, amount of shapes, cuts and subtractions.) * PowerPoint with examples of functional 3D prints, consumerism, pre-assessment, do’s and dont’s and Ideation information. |

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| **Preparation:**  What do you need to prepare for this experience? **List steps of preparation in a bulleted format.** |
| * make and print model * learning to use Rhino and 3D printers * making a PowerPoint * providing examples * creating handouts and a blog * cutting out clay models for ideation activity * having supplies ready for students for decorating puzzle pieces * spraying puzzle pieces with primer before class |

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| Safety:Be specific about the safety procedures that need to be addressed with students. List all safety issue in a bulleted format. |
| When carving do not care towards other people or yourself, do not touch 3D printers, spray paint away from yourself and others, spary paint outside only, wash hands |

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| **Action to** **motivate/Inquiry Questions:**  Describe how you will begin the lesson to **stimulate student’s interest**. How will you pique their curiosity and make them interested and excited about the lesson? **What inquiry questions will you pose?** Be specific about what **you will say and do** to motivate students and get them thinking and ready to participate. Be aware of the varying range of learning styles/intelligences of your students. Some ideas might include: telling a story, posing a series of questions, role-playing, etc. |
| Getting to know you worksheet   1. How can your teacher help you to be successful? 2. In there anything you want me to know about you? 3. What is your concentration   Pre-motivation assessment activity   1. How would incorporate 3D printing into a project in your concentration? 2. Why is collaboration important? What does it teach us? 3. How does it affect works of art? What are advantages of collaboration in art? 4. How can building skills in other content impact how you create art?   Powerpoint presentation  with videos and several examples of artists and uses for 3D printing in the art world.  Ask students about their favorite art medium? Have you ever made a collaborative work of art before? how do you feel about it?How could you use 3D printing in this medium? What could possibilities could it create for your ideas and projects? How can it change things? How could learning new skills associated with engineering and math impact and change your artwork? How is it impacting the use of the other mediums? |

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| **Ideation/Inquiry:**  Ideation is the creative process of generating, developing, and communicating new ideas, where an idea is understood as a basic element of thought that can be visual, concrete or abstract.List and describe inquiry questions *and* processes you will engage students in to help them develop ideas and plans for their artwork. |
| Students will be creating a 3D model of their puzzle piece as a reference/template for their final design on rhino. The model will help them become familiar with the size, shape and cuts that need to made and where based on other students designs. |

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| **Instruction:**  Give a detailed account **(in bulleted form)** of **what** you will teach. **Be sure to include approximate time for each activity and instructional methodology: skills, lecture, inquiry, etc.** Include motivation and ideation/inquiry where appropriate; including what student will understand as a result of the art experience |

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| Day 1 | Getting to know you worksheet   1. How can your teacher help you to be successful? 2. In there anything in particular you want me to know about you? 3. What is your concentration   PowerPoint will be uploaded and history, innovations, examples and ideation will be discussed  Slide 1   * What is 3D printing?   + Process of creating using a three dimensional digital model to create a physical object by producing several thin layers in a sequence.   + Rhino is a CAD program that is used to create 3D prints.   Slide 2   * Brief history of 3D printing   + 3D Printing was invented in the 1980’s and was mainly used for producing scale models and industrial use.   + In the 1990s the patents industrial companies had on 3D printers expired and the start of 3D printing for consumers began to grow.   Slide 3   * 3D printing and impacts on art video   + <https://youtu.be/IS4Xw8f9LCc>   Slide 4   * 3D printing today   + Medical   + Engineering   + Parts and tools   + “Green”   + Commercial products   + Emotional marketing   + Art   Slide 5   * Introduce Project * examples of 3D printed puzzles * Discuss what is a puzzle?   Would have done this next time: Pre-motivation assessment activity   1. How would you incorporate 3D printing into a project in your concentration? 2. Why is collaboration important? What does it teach us? 3. How does it affect works of art? What are advantages of collaboration in art? 4. How can building skills in other content impact how you create art?   Slide 6   * Ideation instructions   + Draw two sketches of how you might want to design your puzzle piece.   + Draw to scale   + Include 4 possible cuts in each   + 3 spheres at least one added and one subtracted   + Record measurements on sketches and for model of where things are placed   + Discuss designs with classmates to figure out how pieces can fit together.   + Keep in mind these elements and principles of design to help with design ideas: shape, form, space, line, movement, perspective, unity   + Record ALL measurements!   + Choose one sketch recreate in a 3D model using clay   + Make it scale   + Work with other classmates see if pieces fit together and make modifications.   Sponge Activity- Research an artist in your concentration who incorporates 3D printing   * What was the process and motivation? * How was it incorporated with the medium? How did this change the work for you? Successful/ unsuccessful * If you were to create a similar project what would you do differently why?   Research a collaborative 3D printed project   * Refer back to motivation activity and your answers. * How does this project prove/back up what you said?   Students will begin sketching in their sketchbooks. Based on sketches they will recreate the sketch as a using clay.   * Clay and clay tools will be handed out, work time will be given. Discussing and collaborating with peers will take place.   Move to the computer lab in the art building.   * tools and instruction worksheet will be handed out explaining requirements and basic tool functions for using rhino. * Using the projector students will be given a demo of how to use the tools on rhino.   + Start Rhino- set requirements - measurement must be in millimeters   + As one step is completed students will repeat it until all the tools have been presented   + Tools and features being used and demonstrated.     - Boolean tool- add and subtract     - shape tool- create 3D shapes     - .gumball- move object and change its shape     - create dimensions- next to the shape     - command key- another way of using tools by typing     - how to change perspectives     - zoom in, out and pan around the entire shape     - onsnap tool     - change opacity- solid, ghosted, wire     - save to file class file used for students to share and view parts of their design     - help menu     - talk about assignment requirements     - resources and help options are explained     - send designs made during the demo to “practicedesign”     - show where folders are – computer--- (Z:) artlab---Emily   Student work time   * If help is need students should refer to example, help menu and ask classmates * For teacher help students will go write on the whiteboard their name and their problem   Sponge Activity- Research an artist in your concentration who incorporates 3D printing   * What was the process and motivation? * How was it incorporated with the medium? How did this change the work for you? Successful/ unsuccessful * If you were to create a similar project what would you do differently why?   Research a collaborative 3D printed project   * Refer back to motivation activity and your answers. * How does this project prove/back up what you said?   Make a copy of your puzzle piece and explore two new tools and apply them to your puzzle piece on Rhino.—Use help menu to understand how to use these tools   * How did this change the original * Likes/ dislikes * Research problems that may occur when printing with Rhino designs? What/When do you need a support structure? What do you do have to do if you have to print it with a support structure? How do you get it off? * Does your design seem to have any of the problems that might lead to these problems? * How can you adjust it and still use your intent?   Create a design from scratch with a partner that does the same (use learned tools) else does the same--- share design in shared parts folder—you open your partners and your partner opens your--- then you will try to re-create each other’s designs. ( make sure the design includes the dimensions your partner used also)  I will provide students a flash drive and they will save their designs on the flash drive   * save as—flash drive-- format stl-- save * demo printing   + show how to upload designs to the printer computer   + talk about the type of printer, how it prints and works   + show the file and the information that should present for a successful print   + show how to view problems   + how to correct them and what to do to correct them   + final step send to printer and print   Printing instruction- upload to flash drive-- upload design from flash drive onto the printer computer –  File load Model—Control print  Printing Settings  quick print—standard beginner  end  PowerPoint will be uploaded to smart board  Slide 1   * video of artists now and 3D printing   Slide 2   * Artwork and videos by Joshua Harker   Slide 3   * Artwork by [Bathsheba Grossman](https://www.bathsheba.com/)   Slide 4   * Vincent Van Gogh flowers 3D print recreation   Slide 5   * Collaboration 3D printed piece   Go to the computer lab and demo printing for students using the projector   * Ask students how I create shapes, cut out materials, add on materials, names of tools, file name, pan screen, zoom in and out, change dimensions.   Go back to the classroom the students puzzle pieces will be handed back to them. I will give a demo on how to sand areas of prints.   * Students will begin sanding * show students teacher example     Students will begin on their ideation assignment and puzzle pieces will be passed back to students   * explore principles and elements of design decide, chose one non art related content area of your own personal struggle a (math, English, etc.) and create images and a composition that works with the form and the material of the puzzle piece   + can use 3D ideation sketches and color them in   + sketches must include principals and elements of design   + can research ideas and document them in their sketchbooks   + must have at least 4 design ideas   + must chose one content area of struggle   + at least four sides that show images that relate to the content area and its relation to art   Student work time to paint puzzle pieces  Student begin using acrylic paint, sharpies and watercolors to decorate their puzzle pieces based on their ideation sketches  Clean up   * clean up paint brushes, rinse out water cups, wipe tables   Reflection   * How would you incorporate 3D printing into a project in your concentration? * Why is collaboration important? What does it teach us? * How does it affect works of art? What are advantages of collaboration in art? * How can building skills in other content impact how you create art? * Challenges/ learnings? * Failures/successes * Dislikes/ likes * Why did you make these choices? * What would you do differently? * Additional comments and feedback by other classmates | **Learning** - Students will... i.e.: explore ideation by making connections,  comparing, contrasting; synthesize possibilities for each painting technique; etc. (Be **specific** about what will be the **intended result** of the instruction as it relates to learning.) **UNDERSTAND**  **understand basic concepts and mediums**  **discussion**  refining ideas and practicing using scale, shape, communication and discussion  listening, following directions and develop understanding  listening, problem solving, following directions, discussing and critical thinking  listening and following directions, developing understanding  using examples practicing 21st century art skills and using technology and communication skills  Listening, using prior knowledge and understanding, making connections  Using prior knowledge and understanding be able to name rhino tools their functions and how to use them.  Using examples and personal connections to create a composition that works with form and function of an object  Using skills learned to think critically and reflect upon process and product | **Time**  10 min  5:00- 5:10  40 min  5:10-5:50  20 min  5:50-6:10  85 min  6:10-7:35  15 min  7:35-7:50  15min  5:00-5:15  15 min  5:15-5:30  30 min  5:30-6:00  20 min  6:00-6:20  45 min  6:20-7:05  5 min  7:05-7:10  35 min  7:10-7:45 |
| Day 2 |  |  |  |
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| **Student reflective/inquiry activity:**  Sample questions and activities (i.e. games, gallery walk, artist statement, interview) intended to promote deeper thinking, reflection and refined understandings precisely related to the grade level expectations. How will students reflect on their learning? A participatory activity that includes students in finding meaning, inquiring about materials and techniques and reflecting about their experience as it relates to objectives, standards and grade level expectations of the lesson.) |
| As a class the puzzle pieces will be put together in various ways before reflecting. The class will then critique the project and discuss their artwork and classmates artwork.  Why did you make these choices?  How did working with Rhino and 3D printing change how and what you can make as an artist?  What were some failures/challenges? Did you overcome them? How?  What were some successes?  Did you enjoy working this way?  What did you find enjoyable/not enjoyable?  What would you do differently?  Was working collaboratively something you would do again/ enjoyed? challenges? Succeses? What did you learn from collaborating with other artists?  Art the squares and circles the correct size?  Do they fit together in any way?  Is the sphere used at least three times? At least one cut was made with a sphere and one sphere was added?  Were there at least 4 cuts made in the cube?  How could you incorporate 3D printing into your concentration?  How would this change possibilities/options for creating in your area of concentration/  How do you think 3D printing will affect art mediums? positives/negatives  Will some art mediums still be practiced or used with the option to 3D print? |

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| **Post-Assessment (teacher-centered/objectives as questions):**  Have students achieved the objectives and grade level expectations specified in your lesson plan? | **Post-Assessment Instrument:**  How well have students achieved the objectives and grade level expectations specified in your lesson plan? Include your rubric, checklist, rating scale, etc. |
| Can students design a 3D puzzle piece transferring ideation from their model for their final product onto Rhino  Can students construct an individual puzzle piece by successfully applying the basic tools in Rhino.  Can students create a square and three spheres using specific dimensions, subtract four times from their square, discuss designs with classmate, use elements design ( space, shape/form, line) and upload at least one thing to the share in the “shared parts folder”.  After projects have been printed SWBAT modify individualize puzzle pieces by using spray paint, paint and assemble puzzle pieces in various ways that express form and function as intent    Can students identify the importance, problems, possibilities and technological advancements in art.  Can students express individual intent and introspect their experience, process, product, failures, problems, successes and frustrations and real world connections/applications. | |  |  |  |  | | --- | --- | --- | --- | | Advanced | Proficient | Developing | Basic | | Create a puzzle piece that includes 4 cuts from their cube, and at least 3 spheres one added and one subtracted with the proper dimensions | Create a puzzle piece that includes 3 cuts from their cube, and 3 or 2 spheres at least one added and one subtracted with close dimensions | Create a puzzle piece that includes 2 cuts from their cube, and 1 or 2 spheres either added or subtracted with some correct dimensions | Create a puzzle piece that includes 1 to zero cuts from their cube, 1 or 0 spheres with incorrect dimensions | | Collaborate with other classmates consistently in order to make a successful puzzle piece | Collaborate with other classmates most of the time to make a successful puzzle piece | Collaborate with other classmates rarely to make a successful puzzle piece | Does not collaborate with other classmates | | Use the proper tools and techniques to create a puzzle pieces | Use some of the proper tools and techniques to create a puzzle pieces? | Use little of proper tools and techniques to create a puzzle pieces? | Does not use any proper tools and techniques to create a puzzle pieces? | | Clearly Express individual intent and style in their puzzle piece using form and function | Shows good Expression individual intent and style in their puzzle piece using form and function | Expresses a fair amount of individual intent and style in their puzzle piece | Expresses no individual intent and style in their puzzle piece | |  |  |  |  | |

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| **Self-Reflection:**  ***After the lesson is concluded*** write a brief reflection of what went well, what surprised you, and what you would do differently. Specifically address: (1) To what extent were lesson objectives achieved? (Utilize assessment data to justify your level of achievement.) (2) What changes, omissions, or additions to the lesson would you make if you were to teach again? (3)What do you envision for the next lesson? (Continued practice, reteach content, etc.) |
| What went well in this lesson is that the students did learn the basics of Rhino and were able to create a puzzle piece meeting the objective of having the right number of cuts and connection points. The students also stayed very engaged while decorating their puzzle pieces they were each able to identify and create imagery related to that subject with good connections to art. They used the surface and form well to communicate these issues and were able to over come frustrations with rhino and decorating independently or by asking for help from peers. I also thought the collaborative part of the lesson was, students helped one another navigate and understand the project they also used each other to create cuts that would potentially fit together.  I was surprised by how quickly students picked up rhino. They struggled at first but were able to work past it and eventually develop a understanding of the basic controls used in the program. I was also surprised by how many cuts students made in their square and how little they wanted to create connection points using the circle. They were not interested in that part at all most of the class met the objective and did not go beyond three circles where the rest did only did two one going in and one sticking out. All of the students exceeded the objective of making only four cuts in their square.  If I had to do something differently I would have made the ideation connect more to the work on rhino or at least clearly explained the reasoning behind it before beginning on the ideation. I would also have changed the reflective activity to be more interactive such as having students put their piece together after talking about their work or have students trade their piece with a partner and have them guess what their subject matter was and how it related to art for them. I would have double checked my PowerPoint presentation to make sure slides and videos were correct and triple checked that the computer lab was available for use. |

**Appendix:** Include all handouts, prompts, written materials, rubrics, etc. that will be given to students.

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| Advanced | Proficient | Developing | Basic |
| Create a puzzle piece that includes 4 cuts from their cube, and at least 3 spheres one added, and one subtracted with the proper dimensions | Create a puzzle piece that includes 3 cuts from their cube, and 3 or 2 spheres at least one added, and one subtracted with close dimensions | Create a puzzle piece that includes 2 cuts from their cube, and 1 or 2 spheres either added or subtracted with some correct dimensions | Create a puzzle piece that includes 1 to zero cuts from their cube, 1 or 0 spheres with incorrect dimensions |
| Collaborate with other classmates consistently in order to make a successful puzzle piece | Collaborate with other classmates most of the time in order to make a successful puzzle piece | Collaborate with other classmates rarely in order to make a successful puzzle piece | Does not collaborate with other classmates |
| Use the proper tools and techniques to create a puzzle pieces | Use some of the proper tools and techniques to create a puzzle pieces? | Use little of proper tools and techniques to create a puzzle pieces? | Does not use any proper tools and techniques to create a puzzle pieces? |
| Clearly Express individual intent and style in their puzzle piece using form, function and content. | Shows good Expression individual intent and style in their puzzle piece using form, function and content | Expresses a fair amount of individual intent, style and content in their puzzle piece | Expresses no individual intent, style and content in their puzzle piece |

Name:

Name:

Getting to know you questions!

I want to create a safe, fun and engaging learning environment that will help with your success in your education and this class. I would like to get to know you, so I know as an educator how to best meet these standards and your needs as a student!

How can your teacher help you to be successful?

In there anything you want me to know about you?

What is your concentration?

Additional Activities

Research an artist in your concentration who incorporates 3D printing

* What was the process and motivation?
* How was it incorporated with the medium? How did this change the work for you? Successful/ unsuccessful
* If you were to create a similar project what would you do differently why?

Research a collaborative 3D printed project

* Refer back to motivation activity and your answers.
* How does this project prove/back up what you said?

Make a copy of your puzzle piece and explore two new tools and apply them to your puzzle piece on Rhino.— Use help menu to understand how to use these tools

* How did this change the original?
* Likes/ dislikes
* Research problems that may occur when printing with Rhino designs? What/When do you need a support structure? What do you do have to do if you have to print it with a support structure? How do you get it off?
* Does your design seem to have any of the problems that might lead to these problems?
* How can you adjust it and still use your intent?

Create a design from scratch with a partner that does the same (use learned tools) else does the same--- share design in shared parts folder—you open your partners and your partner opens your--- then you will try to re-create each other’s designs. (make sure the design includes the dimensions your partner used also)

Save and send to my email: [essmith@rams.colostate.edu](mailto:essmith@rams.colostate.edu)