Endeavor STEM Teaching Certificate Project - FINAL DRAFT

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May 2022

5E Integrated STEM Lesson Plan

Lesson Title: House Building 101

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Topic: *Area of Composite Figures/Scale Drawings*

Big Idea(s): *How important area is in the everyday, real world setting.*

How to accurately calculate the area of composite figures.

Targeted Grade Level: *7th Grade*

Time Needed: *3 days (6 - 40 minute class periods) (STEAM class & Math class)*

Subject Integration: *Math, Technology, Arts*

Justification: By this lesson, students have become proficient and familiar with the area of many shapes. This lesson will tie in a perfect real-world example to why they should always be interested in area and perimeter. Students will be introduced to scale drawings during this lesson as well as the idea behind why we use scale drawings. Ex: model cars & real cars. Students will be exposed to math, technology, and arts. Technology will be used in the form of a blueprinting engine that they will use to make their very own house blueprint using their personal chromebooks. Art will be used in the form of the blueprint. Students will be designing and creating their very own unique blueprint that represents a house of their choosing.

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Common Core State Standards:
CCSS.MATH.CONTENT.7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **CCSS.MATH.CONTENT.7.G.B.6** Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
ITEEA Standards *(If applicable)*
Other Standards **VA:Cr2.3.7a** Apply visual organizational strategies to design and produce a work of art, design, or media that clearly communicates information or ideas. **TECHNOLOGY*:* EL2.** Apply the fundamental concepts of technology operations and demonstrate the ability to choose, use, and/or troubleshoot current technologies.

Measurable Student Learning Objectives:

Students will design a home floor plan using composite shapes and be able to calculate the area of their entire house while scaling the blueprint to an actual home.

Students will design their own, personal, unique project based on the parameters of the rubric. (A rubric will be used to score their project as well as presentation on this section)

Nature of STEM: *The nature of this assignment's core is a mathematics project based around deepening a student's understanding of area & surface area. However, when technology and art are embedded, it shifts the nature of this assignment in another*

direction to tie students into a real world situation that they could very easily find themselves in at some point in their lives. Students will apply their technology skills to show that they can use a blueprinting engine to make a unique product, and they will use their art skills to uniquely create something different that represents their "dream home."

Engaging Context/Phenomena: *By doing the "tour" of Tompkinsville via Google Earth, I am hoping that this will engage some students to take more "ownership" of their house they are designing, so to speak. When you can relate things to a real world setting, students are more likely to see the need for a project like this one and they really take interest in making sure they do the best they possibly can.*

Data Integration: *Possible extension activity based on average salary vs. house cost.*

Differentiation of Instruction: *Extended time will be given to any students that need it. For some students, we will use the feature where it gives them the measurement so they can check their square footage answers.*

Real-life Connection: *This project in itself is based mostly around real-life concepts that most every student will at some point in their life have to face. If students do not build their own house at some point, they will still have to buy or rent a place to live. Every house has rooms, which means every house is a composite shape, which means every house has an area! This is a concept that I hope will stick with students throughout their life and they will remember doing this in their 7th grade math class.*

Possible Misconceptions: *The biggest misconception that I can possibly see happening would be students getting so caught up in designing their blueprint, that they forget what the assignment's basis really is. I want students to get creative, and I want students to have a unique product, but I do not want them to spend so much time on it, that they forget the math portion of the assignment.*

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Lesson Procedure:

5E Model	5E Objectives
Engage	**Procedure:** *Students will be doing a tour of Tompkinsville, KY via Google Earth and will be observing houses from overhead as well as 3D to get ideas for their upcoming project. Students will be listing observations as the tour goes on.* **Modifications:** *N/A* **Standards Addressed:** *N/A* **Formative/Summative Assessments:** *By monitoring as they list their observations, and by also having a class discussion at the end of the tour about their observations.* **Resources:** *Google Earth and blank paper for their list.*
Explore	**Procedure:** *Students will be using sketch paper to sketch out a rough draft of their house plan. Students will be labeling each room with measurements and finding the area of each room. Students will also be introduced to scale drawings. At the end of this process, students will be doing a "gallery walk" to not only hold students accountable, but to be able to bounce ideas off one another for their upcoming blueprint.* **Modifications:** *Some students will receive a list of requirements to help guide them to their own creation. For example: amount of rooms, etc.* **Standards Addressed:** *7.G.A.1 & 7.G.B.6, VA:Cr2.3.7a* **Formative/Summative Assessments:** *The rough draft sketch will be used as its own formative assessment. Students will have to*

	meet the parameters of a rubric to be able to continue with their project. **Resources:** *Sketch paper, ruler, pencil, rubric, calculator.*
Explain	**Procedure:** *Students will complete an activity sheet based on scale drawings with real-world examples. During this time, students will be allowed to work in groups of 3 to split the workload of the assignment. This will allow them to practice the concepts before they complete their project.* **Modifications:** *Some students will be collaboratively working as a group with another teacher. Some students will also have a word bank at the top of their page.* **Standards Addressed:** *7.G.A.1* **Formative/Summative Assessments:** *Students will be completing the activity sheet for a grade. Instructor will also observe students using their modeling of scale drawings using a ruler.* **Resources:** *Activity sheet, pencil, ruler, calculator.*
Elaborate	**Procedure:** *Students will be constructing their own 3D floor plan using "Planner5D." Students will be constructing their own, unique floor plan based off of the sketch they already have. In this phase, students can be as creative as they want to be and will be creating a finished product for presenting. They will work by themselves to create their blueprint through the engine. If they finish early, they will be able to dive into the 3D side of it and furnish their rooms, etc. As students finish, I will pair them up so they can compare and get ideas from each other.* **Modifications** *Scaffolding will be taking place throughout the entire lesson to help students that seem to be struggling with their*

	model. For some students, a list of instructions will be made so they can move forward. **Standards Addressed** *7.G.A.1 & 7.G.B.6, VA:Cr2.3.7a*, *TECHNOLOGY: EL2* **Formative/Summative Assessments** *Students will be abiding by a rubric for the math of the project, but must have a unique house unlike anyone else's. The model will act as its own formative assessment.* **Resources** *Planner5d.com, chromebook, calculator.*
Evaluate	**Procedure:** *Students will be presenting their model to their classmates in an open, classroom discussion. Students will be graded on their model as well as presentation. Students must talk about scale & the square footage of their house while presenting. During this part, students will be able to create one Google Slide with the essential information of their project such as, but not limited to, the total square footage of their house, the square footage of each room, etc.* **Modifications:** *Some students will be graded on a different rubric than other students.* **Standards Addressed:** *7.G.A.1 & 7.G.B.6* **Formative/Summative Assessments:** *Grading the model & presentation based on a rubric.* **Resources:** *Smartboard, chromebook, etc.*

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Teacher Background: *Students will need to know the following to be successful in this project:*

1. *Area is used to find how much a space a shape covers.*
2. *Areas added together find the area of composite shapes.*
3. *Scale drawings are used so we can view things on a "smaller scale."*
4. *Following a rubric to complete a unique project of their own.*

Resources & Links:

Google Earth: https://earth.google.com/web/

Planner 5D:
https://planner5d.com/?utm_source=ptnprgafs&utm_medium=9&utm_campaign=43137&utm_content=624b6897230d2700014f3acd&utm_id=13

Source for "Explain" Activity Sheet:
https://www.lcps.org/cms/lib4/VA01000195/Centricity/Domain/10878/7.3%20NOTES%20n%20HW%20-%20Scale%20Drawings%20Models%20n%20Scale%20Factor.pdf