

5th Grade STEAM Challenge Project Lesson Plan: Build a Football Stadium

This lesson is based off of a current event read and analyzed by the class at the following web address:

<https://newsela.com/articles/super-bowl-be-player/id/25703/>

Students will build a stadium that would allow this technology to be utilized to its maximum potential.

Phase 1 (PLANNING): Students will work in pairs (groups of three where applicable) to complete building requirements for their Building Permits. In their building permit packets, they will complete problem solving challenges to meet the requirements given to them by the city. They will apply content knowledge in all subject areas, seeing how all content area knowledge applies to one challenge. Teacher has analyzed data from previous district benchmarks and has included these TEKS within this phase, along with TEKS that correspond to new learning this week. Students will house this information along with content area notes and vocabulary in their STEAM project folders and access it when needed.

Phase 2 (DESIGN): Once students have completed the packets in pairs, they will meet in designated groups to compare answers and give feedback to each other. Then, they will individually create a prototype that meets the requirements. This will be drawn on paper while they plan what materials will be utilized in order to make the 3D model. Once all prototypes are designed and on paper. Students will compare and contrast them to come up with one prototype based on characteristics from all the individual prototypes. The final prototype will be drawn and put onto paper with materials list.

Phase 3 (BUILD): When students are finished with their prototype as a group, they will utilize the materials planned for to build a 3D model of their stadium. Once their model is built, students will write a minimum of two complete paragraphs describing their model utilizing figurative language. Once project is complete, students will complete two Google form quizzes, one for math and one for science to assess new learning.

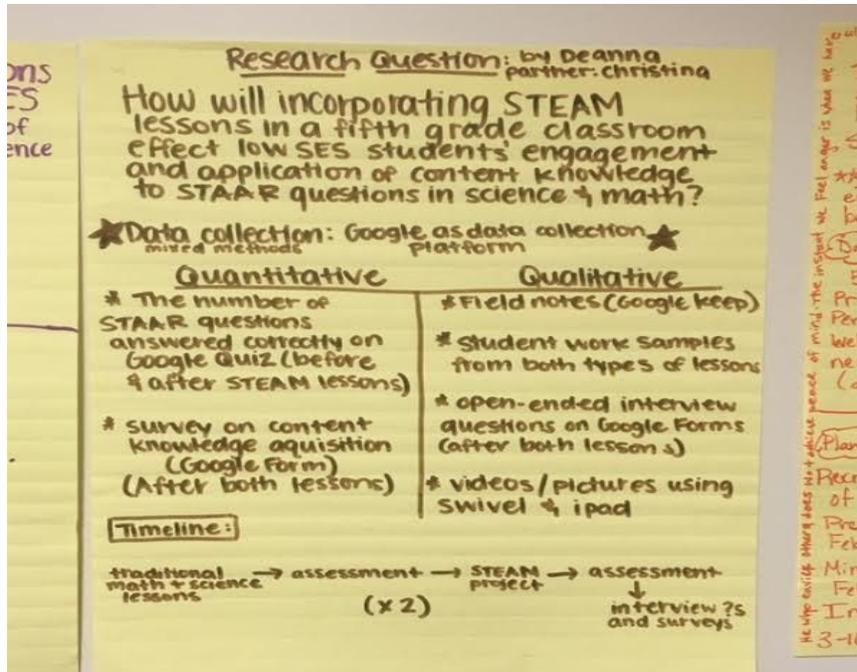
Assessment: Formative and summative assessment measures will take place in qualitative and quantitative measures. Teacher will complete formative assessment while students are completing their planning phase, as they plan their prototype, and during conversations with each other. Teacher will specifically look for proper usage of academic vocabulary. Summative assessment will come from the final project as well as the Google form quizzes, then again during unit tests. The different types of assessment allows for students to maximize their strengths, but also show student growth in mixed measured data. Students will get feedback from

teacher after each phase and from each other throughout the entire project. Students will self-monitor progress by chart on wall. Knowledge is not simply recall, it is students applying interdisciplinary knowledge, prior and new to a real world problem.

Differentiation: Scaffolding for novice learners is present when students use resources in their STEAM folder, such as their academic vocabulary list. Advanced learners will be challenge to come up with problems for the project that include other dimensions such as concession sales, other environmental factors that are needed to be considered etc. These students will be expected to go beyond the information given and come up with idea based on their interests.

Technology: Google is used as a platform for data collection by the teacher and students. Students will complete their summative assessments on Google Forms. Students will use technology where applicable during the design and build phases. Students have access to Chromebooks as needed. Students will also use technology designed for math specifically during planning phase.

Context for learning and planning: This project is based off of an action research project done by the teacher through her graduate program. Reflecting on her classroom practices and needs of her students, as well as her passions as an educator, this teacher designed a series of lessons to collect data on student engagement and application of content knowledge to STAAR like questions. Teacher taught traditional, yet hands on inquiry lessons in the 5E model. Then students completed assessments. Next, students will complete the project and will again take new assessments. During the lesson, student engagement was measured. We are specifically looking at data from subgroup populations, but analyzing data on students labeled low SES.



Context for STEAM Ed.

The Literature

Ch. 1 Lee and Buxton (2010):

- There are continued achievement gaps on standardized assessment measures between mainstream and non-mainstream students (p.11).
- Social class is sometimes seen as a culture (p.13). (It is a demographic variable.)

Molina et. al (2016):

- STEM education has proven to decrease negative behavior infractions in students from low SES communities
- STEM ed makes learning relevant to students
- STEM education helps connect learning to the community and home
- STEM education provides opportunities for students to engage in 21st century learner skills such as: collaboration, communication, creativity, and critical thinking.

DeBoer (2013):

- It is important that all students achieve at high levels in science so that all students receive equitable education
- It is imperative that we keep data the performance and participation of various subgroups of students.
- Students should receive high quality science education regardless of their social circumstances and career aspirations.