

Global Outcomes in 7th Science & STEAM (Joe Frey):

Red=7th grade Science

Purple=7th & 8th grade STEAM

Blue=both 7th Science & STEAM

These are just a few examples of things we do in 7th grade Science & 7th/8th STEAM that are relevant to Global Outcomes. Obviously, the list could go on much longer because it would be impossible to teach without just naturally doing these things in the first place.

Our global outcomes are listed on the last page just in case somebody doesn't know or remember them.

EPMS Science Festival

- Have been doing this for 12 years.
- Student choice in project and presentation.
- In addition to the creation of the project, students are then evaluated by outside experts (Mike Connolly, Ernie Petrocine, Dr. Robert Johnson, and others) and have to communicate their project to those experts. Judging comes from those outside personnel, not the teacher.
- Students can follow Scientific Method format or a Design Thinking approach.

Entrepreneurship: Students working with Ed Grueff starting new business (Jeff Arnold is key contributor on this project):

- Ed has recently bought a new building; is going to start another new business.
- Ed is working directly with 6 students, meeting with them once a week 8th period.
- Students were selected based on needs by Ed (ex: artist for logos and other projects; 2 students selected for website creation; others chosen for their proven creativity, perseverance, critical thinking skills, communication abilities, previous work and collaboration skills).
- Ed is not only serving as a mentor, but also has a true need for some of these students' specialized skills; could be great opportunity for true employment for these students.

Students Work with Actual Clients:

Examples include:

- Creating websites for various people, including some small businesses, Ms. Wharton's Bobcat Cafe, the Estes Park Education Foundation, etc.
- Work/Present with "Rails in the Rockies", demonstrating the use of 3-D printing in model creation, replication, and design.
- Students have created things for clients using CAD and the 3-D printers (ex: name plates for a medical clinic, replicating a model, etc.).
- Creating personalized Christmas cards for the Bank of Estes Park.

Science YouTube Channel with Tech Tutorials Geared Towards Adults:

- The STEAM class is developing video tutorials to help adults with common tech questions and problems.
- Other Science classes will be able to add to this channel as they see fit.

Design Challenges:

Students are given various design challenges throughout the year. Examples include:

- CAD Design Challenges in STEAM (such as "Building a Better iPad Stand) last year when we had terrible iPad stands on the student devices. This project led to two students going in together to buy their own 3-D printer and start their own business after their iPad stands sold really well at the Mountain Festival.
- **Student-choice in presentation formats of information.** Instead of being told HOW to present something, students are given the basic requirements of WHAT information needs to be covered; HOW they choose to get there is up to them (video, keynote, etc.). Students are encouraged to go beyond the basic requirements, and also encouraged throughout the year to try different formats (such as don't just do a Keynote all the time because that is the thing you are most comfortable with).
- Mr. Arnold is a frequent contributor to STEAM on various things; design challenges are one of those areas he has helped with. For instance, last quarter, he presented a design task for students concerning school safety. They then worked in teams on
 - a) how to solve the problem
 - b) creating a video pitch which they had to present to him

Use of Student Leaders to Assist in Teaching STEAM:

- Due to the highly differentiated nature of the STEAM classes (and the fact that there are some students that are better at this "stuff" than I am), I have relied on a couple of student leaders to assist in the actual teaching of our STEAM classes.
- Examples include:
- Luke Stensland (8th grader) comes in every quarter to work with students who are ready for higher level CAD.
- Michael Collins (8th graders) for coding (html).
- Plans are already in place for HS student Carolyn Cromer to be student aide next year to assist in direct teaching.

Mountain Festival Involvement:

- Students who place in the Science Festival can show their project at the Mountain Festival.
- STEAM students present projects that have been done through STEAM classes.
- Last year, I opened this to all students--didn't think it worked well (some of those students were simply there to "get out of class", didn't do a good job of serving the purpose they were there for.
- Have done this since the beginning.
- Other students will benefit by being able to follow the progress of these students as they go through the process.
- Also possibilities through Mr. Arnold's Economics class.

Article Submissions to Local Media:

- At various times throughout the year, students are selected to write articles/press releases to be submitted to the local newspaper (ex: Science Festival, Christmas card sales, special events).
- I give them a simple bulleted list of required information; they write the article then based on that.

Ernie's Teslas!:

- At times, Ernie Petrocine has come into our STEAM classes (he's coming again this quarter) to talk about the electric car and its potential impact on our local and global environment. He also brings his cars and lets the students crawl all over them--I THINK HE'S NUTS! If I ever buy a \$100,000 car, nobody is touching it!

Continued Focus on Student-Led Tasks:

A common flaw of teachers is that they think they have to be doing everything or leading everything in order to be doing their job. I make an increased conscious effort to try not to do this. A couple of examples include:

- **Contacting Silent Auction winners.** The money goes to the students; delegate that to a couple of students who are ahead on things.
- Paired programming with coding. Put students together and force them to work through coding problems (such as debugging) and use curriculum helps/hints instead of defaulting to the old "raise your hand and ask the teacher as soon as you can't figure something out in 5 seconds". That perseverance must be trained into them. And it helps that the teacher doesn't know what he is doing half of the time, so he isn't much help anyways.

Human Body Unit:

- We have a pretty substantial unit on the Human Body which probably goes deeper than a typical middle school curriculum.
- Besides the anatomy & physiology part of it which is in the CO standards, we also apply a wellness component into it. Will alter how I do it this year.
- We continue to do dissections, which a lot of middle schools have gone away from simply due to the expense.
- Having a strong Anatomy & Physiology background, I have a lot of quick "mini-labs" that I do with our 7th graders (ex: heart rate, blood pressure, reaction time, etc.). Can set up as stations, or take one at a time with a whole class.

Competition Tasks:

- We do a lot of tasks where there are "winners". Examples include:
- **Science Festival**
- In STEAM, virtually every project we do has a winner, as if students are competing for a job and there is only one person going to get hired.
- I frequently have the winner that is selected by me (the teacher), and then the "People's Choice" winner which is selected by the students.

Making Pitches:

- Students not only have to create products, they then have to make their pitch to an audience (the class, sometimes outside sources).
- Besides the creation of the product, this includes components such as branding, making a logo, etc.

Student Evaluation of Student Data:

Evaluation of student data is done in class WITH students, and yes, competition is encouraged on a class vs. class basis, and results are posted on our website estesparksteam.com and on the bulletin board in our hallway. Students then evaluate the data, finding trends, correlations, etc. For instance, in the first two units we posted the scores on the study guide and then the test scores for each class, and then students had to find if there was a correlation between the two. Guess what? There was a direct correlation! Who would've thought?

Examples include:

- Comparison of scores for each unit.
- MAP scores.

What are our Global Outcomes?

Communication: I thoughtfully process and express ideas in multiple ways.

Critical Thinking and Problem Solving: I ask challenging questions, analyze complex information, and find solutions.

Creativity: I explore my curiosities and passions in order to produce innovative-imaginative products.

Physical, (Social), and Emotional Wellness: I make decisions that positively affect my physical, emotional, and social health in my pursuit of lifelong wellness.

Compassion and Global Awareness: I seek to understand, value and advocate for, and engage with others in my own community and globally.

Perseverance: I strive to take on challenges knowing I have the capacity to grow.

Collaboration: I build from diverse perspectives and assets when working together toward a common goal.