

Explore! Engage! Engineer!

E3 is Hillsboro Charter Academy's explanation for what we do during the last hour of our day to show our scholars the application or the "why" of what is being taught in our core subjects. During E3 time, we co-teach with specialists to incorporate STEAM, Inquiry Based Lessons, Passion Projects and Guest Speakers, which all facilitate Project/Problem Based Learning.

As a showcase of our daily E3 time to the parents and the greater community, we hold an Exhibition of Learning or EOL. The EOL event is one of the best ways to get a "snapshot" of what is happening at Hillsboro Charter Academy—a world-class education taking place in a small, rural, community school environment.

At these events, students show both the products of their learning as well as the process by which they learned it. They show what they have learned in their classes through means such as "passion projects," and other true Project Based Learning projects, ones wherein they solved real-world problems. One example is when a child found out how to make non-dairy cheese (she is lactose-intolerant). Another scholar, who was impatient as to the earning potential of the interest on his bank account, made 3-D projects on the printer to make more money.

These events are designed to be community showcases—not just for parents and their children, but also the community as a whole—a means for us to present the unique and excellent learning that is taking place here! Exhibitions are almost entirely student-led. The scholars present everything, and they welcome the onlookers to their demonstrations. They engage the audience through a variety of strategies from leading viewers through gallery walks as they pass by individual student presentations to "TED-talk" style presentations up front, to leading special activities such as guided Google goggle experiences.

This "process and product" approach goes beyond a typical science fair, which may just display end results, as it also allows participants to see the process behind those end results. Our scholars are proud of each step of the solution to the problem or design challenge and understand how important it is to make progress towards the goal but not necessarily to achieve perfection every time. This definitely helps to teach our scholars the iterative nature of the design process and that each time they fail (first attempt in learning), it is a little closer to success!

Hillsboro Charter Academy STEAM “212”

Essential Engineering Vocabulary Progression (K-5)

STEAM - Using 21st Century Skills to solve real world problems through the incorporation of *Science* (study of occurrence in nature/natural behavior), *Technology* (anything created to fulfill a want or a need, not only electronics), *Engineering* (solving problems using science, technology and math), *Art* (application of creative skill and imagination through visual methods, including aesthetics), and *Math* (application of mathematical principles), includes at least 2 of the subjects in STEAM

Engineer - A person who asks questions, observes things, and gathers information to invent (create new products) or innovate (make old products better) and uses science, technology and math to solve problems.

Engineering - The use of technology, mathematics, and science to solve problems.

Growth Mindset - Celebrating failure and looking at it as the “First Attempt In Learning”, having grit/perseverance

Engineering Design Process (based on Project Lead the Way) - A step by step way to solve problems

- **Ask** - Define the problem (includes a Design Brief)
- **Explore** - Brainstorm multiple solutions
- **Model** - Choose the best solution, sketch and build a model
- **Evaluate** - Test model to determine how well it worked, rework if necessary
- **Explain** - Share design and results with others

21st Century Skills Focusing on the 4 C’s

- **Communication** - Sharing thoughts and ideas through written and oral methods
- **Collaboration** (1+1=3) - Working together, one idea added to another idea equals a new idea
- **Critical Thinking** - Thinking about problems in new ways
- **Creativity** - Using new approaches to get things done

Computational Thinking/Coding- Instructions written in a way that a computer can understand; a specific step-by-step set of directions to solve a given problem, may be unplugged (without electronic technology)

Engineering Notebook - An engineering notebook is a method for an engineer to keep a history of his or her design project from start to finish. It is a place to document research, observations, ideas, drawings, comments, and questions during the design process. It is a legal document and should be dated every time an entry is made. It is also best practice to write in pen when using an Engineering Notebook.

Sketching - A visual way to communicate design ideas to others and solve problems on paper first, authentic practice for engineers

- **Thumbnail Sketching** - Quick sketch that resembles idea
- **Technical Drawing** - Use of symbols, labels and annotations to explain sketch
- **Isometric/Perspective Sketching** - 3D view of design idea; includes width, depth and height, can include vanishing points, most realistic interpretation
- **Orthographic Projection** - A two-dimensional drawing of a three-dimensional object. A top, front, side and isometric view are drawn so that a person looking at the drawing can see all the important sides.