



Robotics Engineering

A Snapshot for WSD in 2023

Wahkiakum School District

9/16/2023/rmw

Outline

- Education past, present and future
  - Leaving the factory model, entering the entrepreneurial model
- Where WSD fits in
  - Project-based problem solving using hi-tech in natural resources
- Where Engineering Robotics fits in
  - K-12 classroom, competitions, community projects, 4-H and Career Connect
- Where Mecha Mules fits in
  - Mentoring, competitions, community projects, careers, and public awareness
- What more is needed to help make this happen
  - Spaces, people, hardware, career opportunities, continued restructuring

So, why are we doing this?

The Boston Common School Model served the USA fine from about 1830 to about 1960. Its purpose was to homogenize us, to teach us to do what the foreman told us to do during the workday, mostly mindlessly, and then to have a life outside of work. It purposely generated some ‘failures” who could be pointed to in order to keep most of us inline, and it generated a few “creative problem solvers” who designed new systems.

We no longer live in that world. The teacher is no longer a pseudo-foreman. We are expected to guide all of our students to become lifelong learners who problem solve and work well on teams of people with different strengths. We are all expected to become creators and creative problem solvers working within the norms of our organization.

Wahkiakum: Combining natural resources and hi-tech

Niche farming

Niche manufacturing

Eco-tourism

Forestry

Fishing

Remote hi-tech

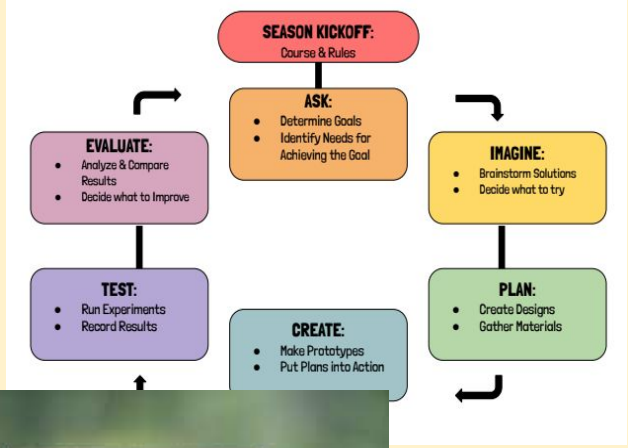
Where WSD fits in

Teaching the Engineering Design Process (EDP) through robotics K-12 is one way to help public education transform itself into this new model for 21st century education; to prepare our kids to do well in their current and foreseeable career future.

Last year our school training focus was project based learning.

This year our school training focus is diversity.

Good robotics teams have all different kinds of people on them, with different abilities, working together on parts of their projects. To end up with really good team completed projects all team members bring their best, and appreciate what each person brings to the team. Project based learning and diversity are essentials.



Where Engineering Robotics fits in

K-5 robotics

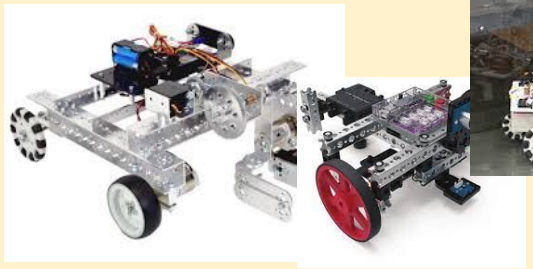
MS class

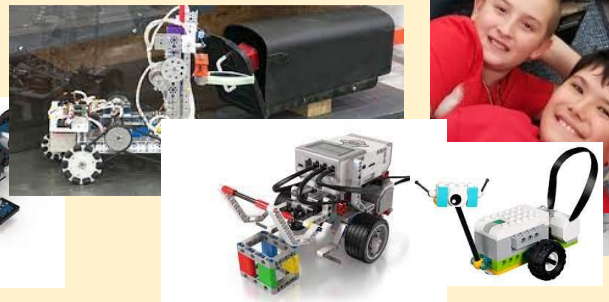
HS class

4-H Robo Rascals

Career Connect 4-H grant (see trifold)

Flipped internships - speakers - liaisons





Wahkiakum County
WASHINGTON STATE UNIVERSITY
EXTENSION

Mecha Mules: Club and Teams (see trifold)

We are one **Club** with many **Teams**.

The **FTC** season starts in September and ends in January. A team of 3 to 15 members compete with others in matches lasting 2.5 minutes in Alliances to score as many points as possible. They also prepare a presentation and engineering documentation. This is for advanced middle school and younger high school students.

The **SkillsUSA** season starts in September and ends in June. Teams of two members compete with others in regional and state competitions in many aspects of engineering, and in over 100 other skills competitions. WSD and NGRVSD both became SkillsUSA chapters this past year to support the 4-H Career Development grant and district goals. In all events, they also prepare a presentation and engineering documentation. This is for high school students.

Community Projects are for advanced high school students who take on projects to help our community.

The **SeaPerch** season starts in December and ends in May. Teams of 3 to 8 members compete with other teams in regional and international tournaments, operating their underwater robot on a mission course and an obstacle course, and prepare a presentation and engineering documentation. This is for middle school or high school students.

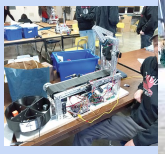
The **KM Cup** is a competition mostly between MS students in classes from Naselle and Wahkiakum to develop future Mecha-Mules, Sept-June.

The **Outreach Team** organizes fundraisers and demonstrations, writes articles, and promotes our Club activities.

The **Mentoring Team** is open to high school students to assist elementary teachers implementing robotics and engineering curriculum in their classrooms.

Mecha Mules: Recent notable accomplishments

- 2023 Seaperch Open Division World Champions
  - Engineering Video First Place
  - Engineering Portfolio First Place
  - Robot Obstacle Course Fourth Place
  - Robot Mission Course Fourth Place
- 2022 Seaperch Open Division Second place
  - Engineering Video Fourth Place
  - Engineering Portfolio Fifth Place
  - Robot Obstacle Course Second Place
  - Robot Mission Course Third Place
- 2023 First Tech Challenge State Community Engagement Trophy First Place
- 2023 SkillsUSA Mobile Robotics State Third Place



What more is needed

Mentors - electrical, mechanical, programming, robotics maintenance

Speakers - all levels and topics

Flipped internships

Additions members for Advisory Panel(s)

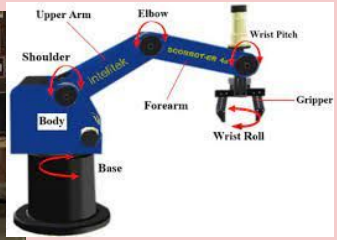
What does industry want? … School program flexibility?

Funding for national competitions

Old but still serviceable industrial equipment - PLC’s, sensors, arms

Career pathways after high school

Appropriately structured spaces for learning



Questions?

Wahkiakum School District

Addendum Slides

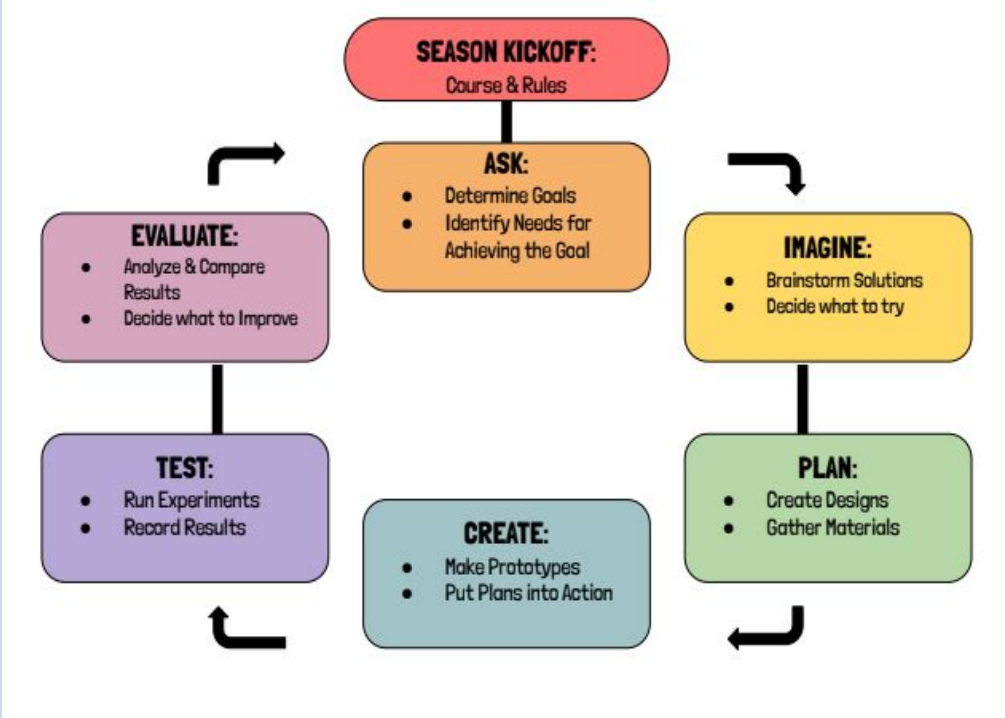
To be shown only if certain questions are asked …

Mecha Mules: Engineering Design Process

Our Engineering Design Process follows the model as given in the diagram (Thanks Arwynn).

Once we are given the challenge, and the due date, we divide that time in half. We decide and assign different parts of our plan to sub-teams. By the end of the first half we have a working model made up from the best parts from each sub-team's efforts. We then use the second half to refine and perfect that model, and to practice using it.

Along the way each sub-team documents in words, photos and sketches its decisions on keeping or rejecting a given solution.



Mecha Mules: Our goal

Our goal is to become professional in everything we do: engineering design process, robot performance, presentations, documentation, communication, attitude, teamwork, mentoring. Where:

- Beginners hope to get lucky
- Amateurs practice until they get it right
- Professionals practice until they cannot get it wrong

We measure how we are doing on our goal by how we do in competitions with other teams, and community support and feedback.

Team Development

We are on a cross-country marathon, not a sprint, wth many handoffs of the baton, and many footpads of pathways to follow for awhile, coming together as we work towards becoming professional..

CTSO: SkillsUSA

SkillsUSA is one of 16 possible Career Technical Student Organizations that we could participate in. SkillsUSA has over 100 possible competitions. Ones that fit our engineering goals are:

Robotics Automation Tech	Mobile Robotics Tech	CNC Programmer
Automated Manufacturing Tech	Telecommunications Cabling	Mechatronics
Engineering Technology/Design	Electronics Technology	Internetworking
Robotics Urban Search and Rescue	Entrepreneurship	Computer Programming
Information Technology Services	Additive Manufacturing	Internet Tech

For SKillsUSA, regionals are in January, State in April, and Nationals in June.

Link for more info: https://www.wa-acte.org/images/pdf/2017%20CTSO%20Facts%20Sheet.pdf

Activities preparatory to the Mecha-Mules

Robotics in each classroom at WSD and NGRVSD (K-5)

4H Robot Rascals (K-7)

Columbia River Robotics Club (Cathlamet homeschoolers, K-8)

Middle School Robotics Class (6-8)

Mecha-Mules JV (5-8)*

Wahkiakum Wohbot Wohundup (K-8+ showcase)

KM Robotics Cup (MS competition each semester)

Mecha-Mules: Projects

Eventually, our vision is that student participation directly in competitions ends by the end of tenth grade, after that, they are more guiding and coaching the teams, and only participating directly if needed.. We are not likely to get there anytime soon.

Instead of competing, these soon-to-be-seniors are working on community projects where they are applying their learning in EDP and teamwork to solving problems in our county, as they prepare to enter the next stage of their careers. .

Examples:

Drainage culvert examination for Vista Park - completed

Puget Island pump pipe video - twice started, never completed.

Elochoman River Road non-invasive automatic bird-chasing garden-protection devices - alternate suggestion followed by client.

Gray's River silt mapping project - never started.

Skamokawa slough cut-off fish counting project - never started

White-tailed deer counting/mapping project - never started

After School Robotics

After school robotics gives students K-8 a chance to dive a bit deeper into robotics, learning other skills that relate: electrical, engineering, designing in Tinkercad to 3D print, and other programming platforms.

Members enjoy making both homemade robots and programming kit robots made by Lego Education.

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360-795-3278

CAREER CONNECT WASHINGTON

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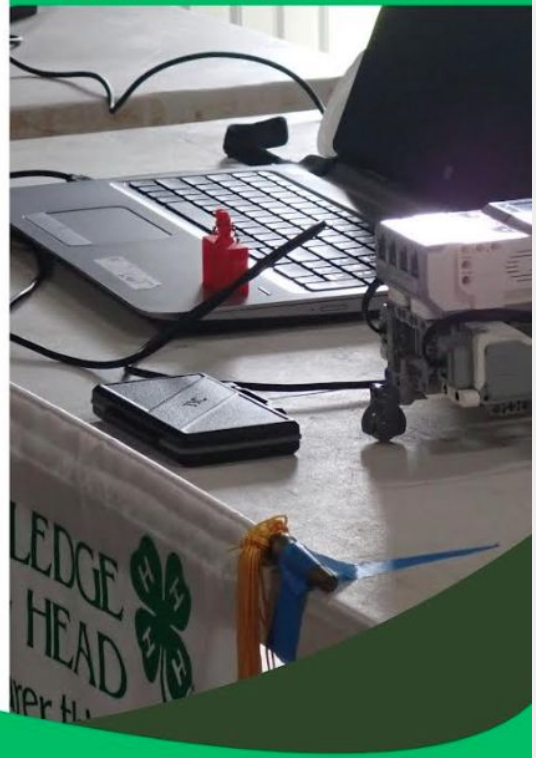
careerconnectsw.org

Working in both Wahkiakum and Naselle Grays River Valley Schools

WSU Wahkiakum County Extension and Career Connect WA



Field Trips

Naselle Fish Hatchery
Fin Clipping Trailer employees donated their day to giving tours to several classes explaining the process of the automated fin clipping system.

Industry Partners

Students are connected with industry partners, learning what jobs are out there and what they need to know to apply. The students get the "who you know" connection before graduating to help them decided what to do after they get their diploma.

Industries also work with students on Flipped Internships, where students are helping businesses solve problems.

Students take field trips to learn more about STEM related industries.

In School Robotics

Executive Summary

Somewhat like the Engineering Design Process is cyclical, always improving, so is our club development. Our response to each competition season challenge builds on what we learned, and how we performed during the previous competition.

Since we start each year with FTC we can normally expect to advance only as far as state, as we integrate new members and relearn how to work well together on our 15-person team.

SkillsUSA mid-year limits us to 2-person teams, yet requires all of the performance of FTC and SeaPerch - allowing and requiring the small groups work in all aspects of a full size team. There are over 80 competitions sponsored by SkillsUSA that MechaMules could be “playing” in.

SeaPerch in the spring is where we demonstrate everything we have learned on all aspects of becoming professionals on teams, and how far we have grown from the previous season.

Throughout the school year we give back to the community by providing demonstrations and presentations, by mentoring in classrooms and other teams, and by taking on community service projects. Email us for more info, at:

info@mechamules.com

Generic Calendar

- Begin FTC Teams - Sept.
- Begin Mentoring - Oct.
- T-shirt Fundraiser - Oct.
- FTC League 1 - Nov.
- Begin SkillsUSA - Nov.
- FTC League 2 - Dec.
- FTC Interleague - Dec.
- KM Cup (Fall) - Jan.
- SkillsUSA Regional - Jan.
- FTC State - Jan.
- Begin SeaPerch - Jan.
- SeaPerch Qualifier - March
- SkillsUSA State - April
- WWW - May
- Car Wash Fundraiser - May
- SeaPerch International - May
- KM Cup (Spring) - June
- Team Celebration - June
- SkillsUSA National - June
- Bald Eagle Days - July
- County Fair - August

To Sponsor Our Club

We accept donations anytime and recognize our sponsors on our shirts, our banners, and promotions. Please contact us at our email address for more info, or make checks out to:

“Wahkiakum ASB” memo: MechaMules

Wahkiakum School District
500 South Third Street, PO Box 398
Cathlamet WA 98612.

Mecha Mules

Wahkiakum School District

Robotics and Engineering Club

Info@mechamules.com

360-795-3271

Update June 2023

Our Club Goal

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We measure how we are doing on our goal by how we do in competitions with other teams, and community support and feedback.

2023 International Seaperch
Champions

Our Club and Teams

Our Club sponsors several Teams, each with its own team leaders, season, and challenges and activities:

FTC (FIRST Tech Challenge) - Robots compete in teams in a 12' by 12' field to score more points than the opposing teams. September - January

SkillsUSA - Over 80 different 2-person events with a broad array of challenges. November - April

SeaPerch - Underwater robots compete to post best times on a speed course and most points on a mission salvage course. December - May

Mentoring - We mentor in MS and elementary school classrooms, support new and younger teams, and coordinate the Wahkiakum Wohbot Wohundup for K-5, and the KM Cup for Middle School. September - June

Outreach - We give robot demonstrations, host fundraisers, give presentations, and work on community projects. September - August

New club members and volunteers welcome anytime, email us at:

info@mechamules.com

Our **Engineering Design Process** follows the model as given in the diagram.

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Along the way each sub-team documents in words, photos and sketches its decisions on keeping or rejecting a given solution.

Unlike School Sports, in robotics there are no divisions based on school size. We are in it at the same level with every other club and school in the state.