Remotely Operated Vehicle (ROV) Engineer And Explore Program

Mission: *What is the reason this program exists?*
To offer a hands-on engineering and technology experience that generates curiosity for Great Lakes careers and practice with problem solving and teamwork.

Vision: *What would perfect success look like?*
Every student builds confidence with experimentation, problem-solving and communication techniques, and gains awareness of how ROV technology can be applied to water protection.

Goal 1: *Why are we doing this program?* To practice teamwork and learn about personal preferences when working with others.	
Objective: *What exactly do we want to accomplish?*	
Do:	● Students cooperate together to design, build and test an ROV ● Students follow communication procedures to test ROV prototypes and operate ROVs ● Students carry out specific roles when operating an ROV
Know:	● A person's tendencies during teamwork will point toward their strengths. ● A person's frictions during teamwork point toward areas of growth.

Goal 2: *Why are we doing this program?* To provide hands-on experiences with technology and the engineering process in a Great Lakes context.	
Objective: *What exactly do we want to accomplish?*	
Do:	● Students engage in trial & error problem solving to build a functional ROV that allows for independent decision-making and encourages creativity and innovation. ● Students work as a team to operate an ROV.
Know:	● Factors like buoyancy and thrust affect how machines function. It takes planning, testing and revision to make a machine work how you want it to. ● Following procedures ensures equipment will last and be ready to go next time we need it.

Goal 3: *Why are we doing this program?* To explore how technology can help us monitor and support the health of the Great Lakes.	
Objective: *What exactly do we want to accomplish?*	
Do:	● Engage in conversation about the applications of marine technology and ROVs.
Know:	● Because we use water so much in all aspects of our lives, we run the risk of harming it. Technology can help us take measures to keep water clean and abundant. ● There is untapped potential for ROVs in industry, research, and conservation because ROVs allow for visual observation in underwater places and are controlled remotely. ● There are many technology-based careers in freshwater and marine protection.

ROV Program Roles:

The **Lead Guide** manages the program while it is happening and:

- Welcomes the group, does introductions, gives safety briefing, introduces the program & missions
- Supports the Engineering Guides , keeps time, manages issues as they come up.
- Facilitates the group greeting, safety, summary, and wrap-up activities.

The **Engineering Guide** runs the ROV Engineering Stations and the Testing Zone, and:

- Coaches and supports students while they design an ROV to meet their Mission goals
- Manages the Testing Zone: student safety, battery charger operation, Mission objects placement
- Guides students through evaluation of their designs and encourages re-design.

The **Teachers** and **Chaperones**:

- Maintain class behavior
- Coach individual groups at the ROV Engineering stations and the Testing Zone

ROV Program Schedule (2.5 hour Program)

35 minutes	Set-up and test equipment and materials. Troubleshoot issues.
Group arrives	
15 minutes	Greeting (nametags), Introduction, Safety talk Orientation: ● "Be an engineer for the day" = Teamwork! ● Teamwork means you each have a role to play. ● Stewardship focus of technology ● ROV Engineering Station: **Design/ Build/ Test/ Evaluate/ Modify/ Repeat.** Build your own ROV to address an Engineering Mission: Out and Back, Spilled Balls, or sunken objects.
1 hr, 25min *Or less, to fit in either the Game and/or the "Show-n-Tell"*	ROV Engineering in small groups to attempt one mission at a time. 1. **Design/ Build** at their own pace with coaching from the ISEA Guides 2. **Test/ Evaluate** in the water at the Testing Zone 3. **Modify** to improve design or if Mission changes 4. **Repeat** testing, evaluation, and modification as long as time remains
20 min *Place where needed*	Group photograph with built ROVs on the dock - "Show-n-Tell" Debrief: ● Reflections on teamwork right now ● Applications of ROVs for protection of water quality and water body health
25 min *Give enough time for directions*	Game Play with all objects in the water, assign point values and give rules (feel free to try new rules: switching drivers, relay races, everyone has to touch a thing, etc.) Summarize Experience at end of time.
5 min	Disassemble ROVs and store equipment properly
Farewell!	

Reset or store all equipment: Clean, Dry, Sort, Collect, Organize, Store, Recharge, etc.