WebQuest Design Template

Teacher/Design Information

Learners

The intended learners for this project are 8th grade Physical Science students of varying abilities. For the most part, they are all accelerated learners, but have differing levels of science, math, and technology comprehension.

Educational Goal

This intention of this design project is to encourage all students to find a role in an engineering process where they learn through the experience of building and designing, as well as developing marketing and sales strategies to find a solution to an engineering problem provided quarterly by the instructor. In doing so, the students will learn the different facets involved with engineering, from design conception to the finished product, through the release of the product into the consumer market. As a result, the students will learn to cooperate in groups and experience the business of engineering while continuing to apply the theories and laws they have discussed in their science, math, history, and language classes. Additionally, the students are required to maintain their blogs and wikis through the Microsoft SharePoint software used by our school on an internal server.

Standards

Being in an independent school I really have no standards to follow; however, my students learning up to the NETS standards for teachers and students. The NETS standards used as a guide by our school's technology department and addressed through this projects are NETS-T 1 – 4 (2008) and NETS-S 1 – 6 (2007).

Process

First, students will be given the task. Next, they will be required to break into one of two 8-person groups within their class. Within each group, the instructor will choose a student as project manager. The remainder of the students will choose which branch of the project they want to direct their focus: engineering, sales and marketing, or animation and technical drawings. Prior to actual building of the project, the group must submit to the instructor a detailed cost and part summary for the future of the project. Additionally, the group must submit a preliminary electronic drawing of the project, as well as a list of roles within the group and students assigned to each role. The students are given an entire quarter to successfully complete their task. During which, they will each have to maintain a personal blog regarding their individual efforts compared to that of their teammates. Each branch of the project group, engineering team, sales and marketing team, and animation team, will be required to submit weekly e-reports to the group-wiki, which is maintained by the project manager. Team members selected by the project manager will create team reports.

Resources

Link to webquest. VEX Robotics kit provided by instructor. Google Sketch-up provided for free from Google. Laptop availability for Sketch-up use when not at home. Cost sheet listing each available part and its associated cost. Physical Science book for access to formulae. Business formulae and spreadsheets. Websites directing each team to assistance beyond the instructor and the textbook. Listings of local construction professionals allowing contact for discussion on the task. Link to VEX Robotics site for additional parts. One one-centimeter diameter rope, length of at least 20 feet. Links to search and rescue sites, as well as SnR material sites. Lists of marketing and sales strategies to incorporate in business aspect of design. All students should have participated in the construction of a VEX robot at some point during the year. I assign two to three easier, less detailed, strictly design oriented projects per year. Technical writing examples for use with sales and marketing strategy.

WebQuest Elements

Title – Canyon Extraction Robotic Design Project

Audience - 8th grade Physical Science

Subject matter – Physical Science – Newton's Laws of Motion, Work-Energy Theorem, Mechanical Advantage and Mechanical Efficiency. Additionally, the students will crossover into business mathematics, technical writing, computer programming, and computer animation.

Author – Rich Edelen

Introduction

During this WebQuest, you are going to assume the role of an engineering business competing to design the next new Search and Rescue life-saving device, a Canyon Extraction Robot. In the remaining 13 weeks of class, you will have to design a robot that will travel across a one-centimeter diameter rope spanning 11.25 meters and one meter above the floor. Your robot must be totally free of human control once it placed on the rope and for the duration of the testing until arriving back at the start or on the opposite side of the room.

Task

Your task is to design a system that to be used during canyon extraction. In its use, your design may rescue injured or lost climbers, hikers, families, or animals. Further, your design should be capable of deployment in an urban setting. Once your robot reaches the appropriate distance from the beginning, it must deploy a rescue basket/claw/sled for a one-kilogram mass to be placed upon and extracted the one meter from the floor of the canyon. Once the mass has been removed from the canyon, your design must successfully return the mass to the start, or continue to traverse the rope to the opposite side of the room. However, this is not the end of your task. You must also present a legitimate sales and marketing scheme for distributing your product to a particular customer group using the websites and local companies and organizations as support. You may want to design a poster, a handout, or PowerPoint presentation for a meeting with a customer. Additionally, a fully detailed electronic sketch using Google Sketch-up must be submitted along with technical descriptions of your product.

Process

1. Separate into groups of eight.
2. Mr. Edelen chooses project manager for groups
3. Choose the team you with which you choose to participate during the project: engineering, sales and marketing, or animation.
4. Team chooses team leader to report to project manager
5. Entire group discuss the task – brainstorm.
6. Submit design to instructor.
7. Business team, submit a budget to project manager based upon cost analysis of parts and brainstorming session with group.
8. Submit cost analysis to instructor
9. Engineering team refine design chosen during brainstorming.
10. Engineering team, re-submit design to business team and get an okay on design cost.
11. Engineering team, submit final design to both business and animation teams with technical specifications for design.
12. Animation team, confirm design and begin technical drawings; confirm cost of drawings with business team.
13. Animation team, submit hand drawings of design prior to virtual mock-up.
14. Team leaders report to Project Manager bi-weekly
15. Project Manager report to instructor at least bi-weekly, more if necessary to remedy conflicts
16. Engineering team begin building
17. Business team, maintain cost of design and animation, as well as formulating a design for sales and marketing.
18. Business team, begin designing presentation of project through PowerPoint, poster, or other sort of presentation.
19. Animation team confirm technical specifications with engineering team to assure continuity of design over the past several days
20. Project manager, maintain order within groups and encourage staying on schedule while encouraging the great effort of your group members
21. Engineering team, begin testing design by fourth week of assignment
22. Engineering team, begin programming robot for full autonomy by 7th week.
23. Business team, finalize cost of total design and building of product and estimate a market cost for your product.
24. Project manager discuss market and cost of design with teacher
25. Animation, finalize drawing and submit to both business and engineering teams for any additions.
26. Re-submit after making corrections.
27. All teams come together for final testing of product and photo-shoot with product by 11th week.
28. Make any additional changes as needed.
29. Project Manager, submit entire design, robot, animation, and sales and marketing data, as well as presentation intended to lure customers.
30. Final testing and presentation of design in front of Mr. Edelen, faculty, and administration.

31. NOTE: ALL TEAMS AND INDIVIDUALS BE SURE TO MAINTAIN GROUP WIKIS AND INDIVIDUAL ACCOUNTABILITY THROUGH PERSONAL BLOGS ON SHAREPOINT.

Evaluation – ADDITIONAL CHANGES TO THE RUBRIC ARE NEEDED TO ACCOMMODATE THE ANIMATION AND BUSINESS TEAMS

The point distribution for this assignment is as follows:

Group programming in month of February	- 10 pts
Completion of robot design	- 10 pts
Robot successfully balanced on rope	- 10 pts
Robot reaches the middle of the rope	- 10 pts
Robot deploys medic board to floor	- 10 pts
Robot extracts victim	- 10 pts
Robot returns/completes extraction	- 10 pts
Design Project Notebook (individual)	- 20 pts
-notebook rubric is below	
Aesthetics of design (looks)	- 5 pts
Safe completion of all tasks with person extracted and robot safely removed from the rope.	- 5 pts
	100 pts (**TEST score**)

Group Wiki and Blog Assessment Rubric

- Name for group and individuals in group/individual name on blog	-10 pts
- Documentation of scheduling for group on wiki and individual on blog	-20 pts
- Sketch/Drawings complete in group wiki and for animation group blogs	-10 pts
- All appropriate notes complete	-30 pts
- Adherence to Buckley Acceptable Use Policy	-10 pts
-Contribution to blog and wiki based upon official guidelines for project	-20 pts

Conclusion

Upon completion of this project, you will have contributed to the world of engineering through business, art, language, science, and math. As a result, you will want to think about how your design can be used in other aspects of everyday life, how you can help influence and aid others through engineering. As a follow-up, I would like to meet with each of you and discuss how you felt the project went, but also whether you would make any changes to the assignment for the future.

Credits

Credits given to Rich Edelen, The Buckley School, Michigan State University – Graduate Certificate in Educational Technology Program, and VEX Robotics.