Robotics and the Language Arts Connection

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1 The Design Cycle

The study of robotics creates a perfect hands-on project-based learning environment. John Glenn Middle School of International Studies structures its curriculum around the Middle Years Programme (MYP). One of the main components of MYP is the design cycle – research –create - evaluate – redesign. Robotics is a perfect example of the design cycle. In robotics students research the scientific, mathematical and engineering concepts that make a robot work. Next they relate this research to a project where they create their own robot. The creation process involves several steps. They must design the many different parts of the robot and then figure out how to build them. Integration of the parts is key to a successful project. After each part is completed evaluation is needed. Does the design work? Will the part integrate with the whole robot? .After the project is complete students must evaluate their creation. They need to answer questions such as, Does the structure of the robot provide stability and strength? Do the mechanics of the robot perform the required tasks? Can the robot move precisely to complete a mission? Do the parts integrate into a complete robot? After evaluating the project, students must then redesign to make any needed improvements shown by the evaluation process.

The design cycle is repeated many times throughout the development of a robotics project. Students might start with one part of the robot such as the chassis. Just designing a chassis is a project within itself. Yet it is just the beginning of creating a working robot. Each of the many parts of the final robot must integrate seamlessly into the whole in order for the robot to function properly.

Language Arts plays an important part in the design cycle. Keeping accurate records of what was done and how it was done is very important in the evaluation process. If part of the robot doesn't work, but you can't quite remember how you put it together, redesigning it will be difficult. If students keep a daily journal of their work they will be able to refer to it during the redesigning phase of the project. The journal needs to be specific and not just today I worked on my robot. An example: One of our team's robot chassis wouldn't turn properly. Something was wrong with the back wheel base structure. The student who had designed that part decided to take it apart and fix it, but after it was in pieces on the table, he didn't have a clue as to how it went together. He didn't have any drawings or journal entries that talked about how the back wheels were designed. The only recourse was to just start all over again. Keeping an accurate journal of the building process or even just taking pictures of the process would have saved a lot of extra work.

2 Promoting Robotics Through the Language Arts Connection

To promote the robotics club at John Glenn , I always emphasize how much of the process involves writing, critical thinking, and problem solving. There are many ways to incorporate writing into robotics. The key to success is being structured. When students

join the John Glenn Botball team they must sign a contract that spells out exactly what they will expected to do during the year. This way there are no shocked students when you say that their ten page paper submission is due. See page 8 for a sample permission slip used for the JGMS Robotics Club.

Students can participate in the Botball website contest in the beginning of the school year. I read the challenge this year and sat down with the students to come up with a list of questions that needed to be answered through research. Then each student took the list of questions and did their own research and wrote out answers. Each student was then assigned to do one part of the website, writing about that subject and entering the information into the website template. Groups of students were also assigned to work on pictures and animations for the website. Several students used projects created in their video productions class.

Look for ways for students to share what they are doing in robotics. Some of my students use their experiences in projects for other classes. We go on field trips, visit universities, and participate in community service activities. One of my students helped teach robotics workshops to younger students. Two of the students went to present to a local rotary club. Three of them used robotics as part of their personal project for eighth grade. Each eighth grader has to do a personal project on a subject of their own choosing. They can create a website, write a paper, make a video, build something and then present it to a panel of judges. This personal project is one factor in graduating with honors or distinction. One of our students even used robotics as his required science fair project.

Last year our Botball students presented at the JPL Open House. This year they went to the Cal Tech Middle School Robotics Conference. These were both wonderful experiences for the students. They had the opportunity to meet with real scientists who do robotics for a living. They met the mission director for the Spirit and Opportunity rovers and talked to several professors from Cal Tech. We had the opportunity to attend the conference because I am on several email lists for robotics. One of them is Roboeducators. That way I hear about many different opportunities.

By connecting Language Arts with robotics you can open up the world to your students. Along with all of the great hands-on activities already associated with building and programming a robot, your students will find many more opportunities to share their experiences with others.

JGMS Robotics Club Application/Permission

(Please Print)
Student Name: _____
has permission to become a member of the JGMS Robotics Club. I understand the club members will be building robots and that kits contain electrical components and small parts. Students are required to follow all club rules, be responsible with school equipment and behave appropriately at all times.

Students will be expected to participate in the all of the following activities throughout the year.
The Research and Design Challenge - Building a website about a robotic subject. This years subject is Assistive Technology. Students will be doing research. writing about this subject, drawing illustrations, and sharing their own ideas for future assistive technologies.

Paper Submissions for the National Conference for Educational Robotics.
Students will be expected to write a 5 to 10 paper on robotics to submit to NCER.

Daily Journals. Students will keep journals of their work during each club meeting.

Exhibits and Field Trips. Students will go on field trips and present at different function through out the year
promoting robotics.
Examples: JPL Open House Presentation, Jet Propulsion Laboratory in Pasadena
Living Desert Earth Day Presentation, Adopt A Class Open House.

California State Media and Multimedia Festival Entries Students will create presentations, websites, etc to enter in media festival.

Photographs Students will take photos during meetings

Robotic Book Students will write and publish a book documenting their experiences during the year. iPhoto and Photoshop will be used.

Student Signature: _____ Grade:_____
Science Teacher: _____
Parent/Guardian Name: _____
Parent/Guardian Signature: _____
Date: _____

Return this form to Mrs. Reynolds, John Glenn Middle School, room 207 (in the library)