Reading, ‘Riting, Robotics and Respect: WIDA Key Uses and Technology

By Jennifer L. Otto, MSA Teacher, Seven Hills Charter Public School

**BEGINNINGS** Good morning! Two years ago, when I was planning to improve my library and asking students about their interests, several of them said, “I want to build a robot!” “Well, that’s impossible”, I thought, but that was the seed for a program which is still growing and improving.

I’m Jennifer Otto. I’ve been teaching English Language Development to the second and third-grade multi-lingual students at Seven Hills Charter Public School in Worcester for four years. I’ve held a number of titles through my more than thirty-five years of TESOL instruction, but by far my favorite is the nickname the students have given me of Robotics Teacher.

Through the Seven Hills Robotics Education Club, or SHREC for short, multi-lingual students who struggle to read and write around abstract topics are motivated to participate in partner conversations and academic discussions, read for information and pleasure, and write around robotics topics. They also develop social and emotional skills in the real-world scenario of working as teammates to build, program and debug robots.

**Research** has shown that ELD instruction should integrate meaning and communication to support explicit teaching of language (Saunders, W., Goldenberg, C., & Marcelletti, D. (2013) ESL teachers can select a unit based on students' interests and their personal backgrounds and choose authentic texts that are comprehensible to their level of English. (Brown, C.L. (2007). With this in mind, SHREC began two years ago as a response to that expression of student interest in building robots. I recalled how successful Salem State University had been with their summer literacy program where students became scientists observing the ocean. They focused on increasing English learners’ writing achievement through authentic experiences and texts. I began to think of a number of ways English Language Development could take place using robotics as part of its content. With assistance from our Director of Student Support, I was able to work out the logistics and start the club.

In the first year, we had 12 third-graders and three seventh-graders in the club. I participated in a robotics workshop for educators at UMass Lowell. We received 3 LEGO Mindstorms EV-3 Robotics kits from UMass Lowell, and one more through DonorsChoose.org. Our students began in earnest to build and program robots, with a strong emphasis on working in teams to require authentic language use. They also wrote brief descriptions of their robots and programs. Ten of the third-graders and the three seventh-graders presented their robots and their writing binders at Botfest New England in the spring.

**GROWTH** SHREC began this year with two more core kits from the Linda Schulman Innovation Fund, bringing us to six, and two expansion kits from my church. As we began our 2016-2017 school year, I had two new goals: to incorporate the WIDA Key Uses into our robotics curriculum, and to train a smaller group of third-graders as “Experts” to assist with the twelve other students. We also decided to add to our 2015 motto of Reading, ‘Riting, and Robotics. Our fourth “R” is now Respect, which reflects our social emotional learning goals.

Last summer, I participated in the Massachusetts ESL Model Curriculum: Next Generation ESL training, where we focused on the WIDA Key Uses 2016. They can be represented by the READ acronym: Recount, Explain, Argue and Discuss. This year SHREC has had a clearer focus in its literacy program. In addition to supporting key English Language Arts standards, students practiced key academic language around micro functions including naming, describing, sequencing, comparing and contrasting, cause and effect, stating and justifying an opinion, and predicting:

* We recounted key concepts of robotics and classified robots by function or appearance.
* Scholars undertook a writing project to recount a main idea and details about a particular class of robot.
* SHREC members also explained the steps in building a robot to their partners, or described their robots and programs, including predictions and cause and effect.
* Students compared and contrasted humans and robots.
* In our last session, we will argue about the pros and cons of robots in society.

SHREC members have been able to borrow from an extensive library of fiction and non-fiction texts, and also to research topics on the Internet.

This school year, I began with twelve members of the club, taken from my 26 multilingual third-graders. One of my initial goals with SHREC was to motivate lower-level readers, as well as to interest girls in technology.

However, I had a number of interested students who began the year nearly at grade level in their reading. I wanted to give them the chance to learn robotics as well. As a result, we began our SHREC Experts Group. Three groups of four students were meeting for an hour each on Friday mornings. Six experts were chosen to meet one Friday afternoon a month. They were given additional training in building, programming, and leadership skills. Each expert mentored two other students. They made every effort to use language to tell students what parts they needed and how to assemble the robot. They also showed other students how to program. The Experts were often reminded to set a good example by their behavior at SHREC and in the rest of their school day.

**OUTCOMES** Forbes Magazine says that including a graph fosters greater trust in a speaker, so here you are! (They also say you should use a middle initial, which I’ve done, and dress the part, which I have not.)

Examining the words of our motto in reverse, we have been able to see four areas of growth.

RESPECT: We have seen a great deal of growth in social and emotional learning.

Students have felt **connected** through their experts group, through their small teams, or as members of the club in general. They have learned to work together, assisting each other with building, programming, identifying parts, describing the robots, or reading and writing. When a program or robot didn’t work, students learned to work together to “Fix the problem, not the blame.” Students were reminded as necessary to respect their peers, the adults at school or at Botfest, the robots and materials.

Students felt **capable** as they learned to build, program and present their robots. The experts gained confidence as mentors. As we progressed through the year, all of the students engaged in building and programming, but they began to see the areas they were best suited for as well. Multiple intelligences were allowed room for growth!

Each student **counted** in our program. Each was a valuable member of our teams and clubs, with different skills to contribute. Students were the envy of their classmates. Many peers wanted to be in Robotics, but only the MSA students could participate! Absenteeism and tardiness decreased for several students enrolled in SHREC.

Students developed **courage** as they acquired the new skills of building and programming, as they taught their peers these skills, and as they presented their robots at Botfest, at school and on other occasions. Lessons were structured to allow students to be successful.

ROBOTICS: This one is fairly obvious. Our third-graders were able to be successful in building robots and programming them, as well as learning many key concepts. The students here today will give you a taste of their learning.

READING and ‘RITING: Students were extremely interested in our non-fiction library. They could have spent all day pointing out their finds to each other! They also enjoyed our informational poster project, especially working on Google docs.

We did not get the time I’d hoped for to read some of the fiction together. Some students borrowed books for their personal enjoyment.

Students definitely developed their oral language skills through the club, including the key language uses we were targeting. This was very evident as many of them presented in April at New England Botfest, and should also be evident today!

**THE FUTURE** We are restructuring our academies at Seven Hills for next year. I will be instructing some third-, fourth- and fifth-graders. I’m not sure yet what format SHREC will take or which students will be serviced. Seven Hills has been very supportive of the program, and does want it to continue. I also hope to see increased collaboration between SHREC and other robotics programs at the school. I also hope to include more field trips, invited speakers, and presentations.

**THE CURRICULUM and RESOURCES** The curriculum will be posted. I have revised it extensively based on our experiences. I split it into two parts, the concepts and the LEGO Mindstorms, after finding the need to be more flexible on time. We essentially spent half an hour per curriculum in one lesson. Some groups may progress faster on one curriculum than the other. I will also post this presentation, my library, and information on materials, funding and instruction.

**EXTENSION OF THE CONCEPTS** Consider various ways to integrate English language Development with authentic, student-interest-led content:

* Create your own **robotics program**. Adapt my program for your students by choosing simpler or more complex texts or worksheets, or covering more per lesson. Use simpler or more complex robots, such as Dot and Dash, Ozobots, Sphero, Ollie, mBot, Cubelets, Roboblocks, Thymio, Artbotics with Mindstorms, Vex, and Anduino
* Try **other LEGO products**, such as We Do.
* **Cuisine** Theme. Informational reading/writing around nutrition or specific cuisines. Persuasive writing/speech around a specific cuisine. Explanatory language of recipes. Personal narrative s about an ethnic holiday. Target the diversity in your classroom! Students love seeing cookbooks for their native cuisine.
* Explore the **Maker Movement**: making things yourself instead of buying.
* For simple projects, assemble **jigsaw puzzles** on different themes: science or social studies content, fairy tales or other fiction …
* Build a unit around **dance, music or fashion** (my students requested books on shoes. The sneaker books I ordered were very popular!)
* **Home Design**. There is software available for students to design their own rooms or homes as floor plans and then in 3-D. Many language skills could be targeted: description, comparison, explaining the design, opinions…
* **Family Histories:** We compared family immigration stories with those of the Pilgrims. (narrative, description, comparison…)
* **Nearby Landmarks, Attractions, Town History…**

Get creative and envision new ways to develop English language Skills through engaging content! Be sure to put in a proposal to the Linda Schulman Innovation Fund next winter!

**STUDENT PRESENTATIONS** Now let me introduce you to our Experts! They will be presenting their work to you today. Ursula enjoyed presenting at Botfest so much that she begged to join the experts for their last session, and is here today. Domanic and Rejoyce joined us a few months ago, when two of our other Experts had transportation issues. Evan, Jayla and Andres have been with us most of the year. Please gather around one of their tables. The students will appreciate it if you leave comments after their presentation. Also, please fill out the brief evaluation of the workshop!

REFERENCES

Brown, Clara Lee, (2007). Content Based ESL Curriculum and Instruction, American Exchange Quarterly, <https://www.thefreelibrary.com/Content-based+ESL+instruction+and+curriculum.-a0165912654>

Saunders, W., Goldenberg, C., & Marcelletti, D. (2013). English language development: Guidelines for instruction. American Educator, 37(2), 13–25.