Chapter 12
Educational Robotics Meets Inquiry-Based Learning:
Integrating Inquiry-Based Learning into Educational Robotics

Amy Eguchi
Bloomfield College, USA

Lisbeth Uribe
The School at Columbia University, USA

EXECUTIVE SUMMARY

The chapter introduces an experimental approach to integrating inquiry-based learning into educational robotics in an after school program at a private school in New York City. Educational robotics is a learning tool that can provide a hands-on learning environment in which students constantly encounter problems that trigger inquiries. However, because of the chaotic nature of the educational robotics hands-on learning environment, especially in an after school setting, student inquiry based learning was not obvious to the students and teachers. The authors developed a digital Robotics Engineering Journal to ensure that learning through inquiry became visible. Through the experiment, the authors learned the importance of scaffolding the process of students documenting their learning, while remaining flexible and responsive to the needs and desires of the students.

DOI: 10.4018/978-1-4666-0068-3.ch012

INTRODUCTION

Technology is ubiquitous, yet our students rarely stop to think about how it works. They are the "digital natives," as Prensky (2001) defines, or "born and growing up digital" (Palfrey & Gasser, 2008; Tapscott, 1997). Their lives have been surrounded by technology since they were born. In addition, we, as adults, who are "digital immigrants" (Prensky, 2001), take it for granted that technology is everywhere in our lives. We rarely stop to think about how technology is influencing and can enhance our lives.

When the dog-loving son of one of the authors was one and half years old, he was introduced to an AIBO (robotics dog developed by Sony[1]). The young boy was very excited to see the "dog" and at first sight exclaimed, "Puppy!" Instinctively he reached out to touch AIBO, chatting and playing with it as if AIBO had been a real dog. After playing with AIBO for about ten minutes, he placed it on the sofa, sat next to it for a while as he would do with a real puppy, and said "Mommy, let's play something else." To her amazement he then simply turned the robot off by pressing the switch below its neck. This made her wonder "What happened?", "How should I interpret the situation?", "What was he thinking?" and "What should I do about it?" There are many unknowns about the influences that technology might have on our lives. How can we teach the new generation the fact that those sophisticated technologies, including robotics, can be controlled by us? We need to think about ways to use technology to improve the human experience.

We need an "object to think with" in order for us to understand and construct new understanding and knowledge of our world (Papert, 1993). A robot can be an ideal object to think with and make us realize the importance of thinking about technology. Educational robotics, as part of emerging technology that we will be encountering more and more in the coming years, provides opportunities for us to pose questions and "think" more deeply. Learning with educational robotics gives our students this moment to really stop and think about technology. When designing, building, programming and documenting autonomous robots, students have opportunities to not only learn how technology works, but also apply the skills and content knowledge learned in school in a meaningful and exciting way. Educational robotics can provide a learning environment rich with opportunities to integrate many disciplines, including math, literacy, technology, science, social studies, dance, music and art. Students working on an educational robotics project can encounter an opportunity to find new ways to work together, express themselves, problem-solve, and think innovatively. Robotics gives students immediate, objective and unequivocal feedback on whether their robot design, construction or program is successful.

This chapter introduces an experimental case study of a primary school that integrates educational robotics into its curriculum and provides students with the