Integrating Educational Robotics to Enhance Learning for Gifted and Talented Students

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EXECUTIVE SUMMARY

Using educational robotics as a learning tool fosters gifted and talented students' learning, helping to instill the qualities necessary for them to be successful 21st century citizens and innovators who can profoundly affect the future US economy. Educational robotics provides a stimulating hands-on learning environment in which students constantly encounter problems that trigger inquiries, inspiring them to develop new solutions, test them out using the physical robots, and reiterate the process until they successfully solve the problems. Although educational robotics is considered "the most perfect instructional approach currently available" (Gura, 2013, para. 2), just bringing the tool into a classroom does not necessarily create the learning transformation that we wish to witness. The chapter presents the theories behind ideal Robotics in Education (RiE) approaches, introducing tips to ensure effective student learning and to maximize the potential of able students to display giftedness.

INTRODUCTION

In recent years, efforts to encourage innovation through expanding STEM fields in education have been discussed as critical for strengthening the economy in the US. Wagner (2012) urges that there is a general agreement that the new economy has to be based on innovation:

We have to become the country that produces more ideas to solve more different kinds of problems. We have to become the country that leads the way in developing the new technologies for sustainable planet and affordable health care. We have to become the country that creates the new and better products, processes, and services that other countries want and need. … We must out innovate our economic competitors. (p.3)

Wagner (2012) introduces the Seven Survival Skills in his book, *the Global Achievement Gap,* which includes:

1. Critical thinking and problem solving
2. Collaboration across networks and leading by influence
3. Agility and adaptability
4. Initiative and entrepreneurship
5. Accessing and analyzing information
6. Effective oral and written communication
7. Curiosity and imagination (p.12)

Wagner continues to argue that the Seven Survival Skills are not enough for becoming successful innovators. Through his interviews with innovators, Wagner's research suggests that the qualities of innovators also include perseverance, in particular a willingness to experiment, take calculated risks, and tolerate failure. Although those are not the kinds of qualities that are emphasized in schools because of the extensive focus on standardized testing, these qualities are included in the core of 21st century skills that have become the focus of education in recent years. Moreover, those are the qualities that can be well-fostered through Robotics in Education (RiE). Gura (2013) explains what educational robotics can bring into classroom:

I feel that robotics just may be the most perfect instructional approach currently available. It offers classroom activities that teach high-value STEM content as well as opportunities to powerfully address ELA Common Core Standards. In fact, there are connections to robotics across the full spectrum of the curriculum. Robotics is also a highly effective way to foster essential work skills like collaboration, problem

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