


Chapter 5

Educational Robotics as a Tool for the Development of Collaboration Skills

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ABSTRACT

There is a wide range of ongoing research focusing on educational robotics and its effects on the development of student skills. Most of the literature review pinpoints the fact that the involvement of students with educational robotics increases or develops teamwork or collaboration skills. In most cases, this is argued without presenting significant or specific measures or even significant observations in students' behavior. This first research attempt aims to deliver a framework in which students can develop collaboration skills through the use of educational robotics. In order to produce this framework, collaboration principles were molded within the proposed strategy. In addition, the implemented strategy was observed through the spectrum of developing the collaboration skills that Hesse and his colleagues proposed. At this point, there is a need to understand that collaboration is not viewed as the means to achieve the learning effects in this work, but collaboration has to be viewed as the final outcome of the educational robotics students' involvement.

INTRODUCTION

Collaboration skills are believed to be vital for students entering the work environment in future. In addition, collaboration skills are also included as a critical set of skills within the “21st century skills” framework. Therefore, it is meaningful and useful to investigate how these skills develop, in order to

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enhance the skillset of students. Research needs to prove in each robotic project or course if the learning goals were reached, if more children become interested in science and technology or develop significantly better cognitive or social skills (Alimisis D., 2013).

The first author introduced educational robotics as a Computer Science teacher for the past 6 years within and outside the classroom environment and participated in 3 educational robotics competitions. Even though the results in the competitions were positive and successful, there was a constant concern on the way ER is implemented in terms of techniques and pedagogies. These last 3 months within the pilot phase of implementing a different philosophy approaching ER the results are encouraging in terms of students' behavior in a deeper level.

But what is this work about? The first main question behind this work is to attempt to answer the fundamental one. Can ER kits combined with the appropriate pedagogy help the students to develop their collaboration skills? Are all ER kits the same? What is considered to be collaboration? And what are the collaboration skills that are important to be fostered? Then the immediate question that is derived is another one. How can we foster these skills?

In order to attempt to answer the basic and fundamental questions there is a need to initially deliver clear and precise definitions of all the meanings that are included within the questions. The two main terms that need to be defined are the terms of collaboration and Educational robotics.

The first chapter delivers a brief but solid explanation as to what the authors mean with the term "collaboration". Immediately after, the second chapter aims to present a set of collaboration skills that are measurable, assessable and teachable for educators. The next chapter (Trojan horse) delivers the way the authors view educational robotics as a tool. One of the most important chapters of this work is the chapter push vs pull. The underlying philosophy of collaboration theories are presented within this chapter transformed into practical and everyday didactics. The terms push and pull were borrowed from industrial manufacturing strategy and they basically describe the way a product is launched in the market. Where a "push" system would generally describes all the effort to sell a product to people without acknowledging their needs and the "pull" system would be generally the way of selling a product tailored to the needs of the people. It may sound as if there is no difference, but those two systems have a totally different mindset when it comes to the functionality of a company.

Of course this work does not attempt to analyze manufacturing engineering but to explore new strategies for students to attain collaboration skills. However, wouldn't be to the core of collaboration philosophy to transform students and teachers to collaborators? Wouldn't that be the right guidance to hone collaboration skills?

It is important after these chapters to describe the settings that the research took place. The settings play an important role for this work and are a mixture of elements that are stable within the hard typical educational framework (time, laboratory) and elements that are flexible (work-space, group size, gender, roles or...no roles) in terms of designing a strategy. After presenting the settings, the next chapter gives an insight on how the work was conducted by both the students and the teacher in relation to the collaboration skills that were needed to be developed. The observations regarding the development of collaboration skills are presented immediately afterwards. The discussion that follows aims to shed some more light to the argument that was initially stated and present the limitations and challenges that this work has faced.

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