



# DEVELOPMENT OF ROBOTICS IN ELEMENTARY SCHOOL

Mukhasheva Meruyert\*

<sup>1</sup>Doctoral student of the specialty “Pedagogy and Methodology of Primary education” Zhetysu University named after I.Zhansugurov, Republic of Kazakhstan.

\*Corresponding author

DoI: <https://doi.org/10.5281/zenodo.7782633>

Many researchers and teachers agree that the inclusion of Science, Technology, Engineering, and Math in early education provides a strong motivation and a great improvement in learning speed. Most curricula in primary schools include a number of concepts that cover science and math, but less effort is applied in teaching problem solving, computer science, technology and robotics. The use of robotic systems and the introduction of Robotics as a curricula subject can bring the possibility of transmit to children the basics of technology and to give them other kind of human and organizational values. The subject of Robotics becomes part of the Primary school curricula. The program has allowed the teachers training and a complete way through which children have demonstrated great learning abilities, not only in mere technology but also in collaboration and teamwork [1].

Many researchers have studied the possibility of using robots to support education. Research has shown that robots can help students develop problem-solving abilities and master computer programming, mathematics and natural sciences. The educational approach, based mainly on the development of logic and creativity in new generations from the first stage of education, is very promising. To achieve these goals, the use of robotic systems becomes fundamental if it is applied from an earlier stage of education. In primary schools, robot programming is fun and therefore an excellent tool both for familiarizing with ICT and for promoting the development of logical and linguistic abilities of children. Moreover, teaching robot programming also becomes an opportunity for elementary school students to develop their linguistic and logical skills, always paying special attention to pedagogical rather than technological issues. This article presents an innovative program designed to teach the basics of robotics in elementary school as an academic subject. The same tools are used as interdisciplinary validation and motivation for other subjects (languages, mathematics, natural sciences, etc.).

LEGO Education WeDo is an easy-to-use robotics platform that introduces young students to hands-on learning using LEGO constructors and the simplest form of graphical programming that National Instruments can offer. It's a fun and easy way to introduce younger students to basic engineering concepts at an early age. Using LEGO Education WeDo provides a hands-on learning experience that actively engages children's creative thinking, teamwork and problem solving skills. LEGO Education WeDo is a practical platform that elementary school students can use to create simple robotic applications controlled by a personal computer with a simplified version of LabVIEW. Combining the intuitive and interactive interface of the LEGO Education WeDo software with the physical experience of building models from LEGO bricks, students can connect the physical and virtual worlds to provide the most practical and intelligent learning ([LabVIEW Graphics System Design]). This system is being applied in other countries, offering their use in primary schools and exploring possible benefits for children's education. For example, in [2] the author analyzes the situation of the first contact, in which students of the 3rd grade of elementary school for the first time encounter LEGO WeDo. The article describes a pilot study of robotics in

elementary schools, as well as the motivation for choosing LEGO WeDo for classes with children: a low learning curve of the programming language (visual programming, not writing code) and the educational content provided by them [3].

In recent years, there has been a development of cooperation between National Instruments, the Polytechnic University of Marche and primary schools in order to improve the use of new technologies starting from the first grade of school [4].

Both the scientific and educational communities recognize the role of ICT companies' investments in improving science and engineering education, introducing students to technology and providing teachers with resources that will help them teach fundamental engineering concepts in an exciting and practical way. In particular, National Instruments and Lego provide interactive learning experiences in the real world; inexpensive and free learning opportunities; a powerful global mentoring program; technology and funding [5].

Initiatives such as K12Lab.com for primary and secondary school teachers and the NI courseware portal for university teachers contain effective content that teachers can use directly or adapt to their learning environment [6]. K12Lab is a website where teachers can view and share lesson plans, get inspired by what others are achieving with technology, and get tools and support to help their students connect theory to reality faster.

The improvements registered by teachers are very relevant and have demonstrated the tremendous value of using a robotic system in every aspect of learning. Students have always been curious about certain aspects of learning, from the pure design of robots and programming to the importance of working together in a group, achieving new skills and solving new problems. There are also some students who are directly involved in practical activities, in particular in visual programming and mechanical design of robots.

#### REFERENCES

- [1]. S. Merlo (2010). Costruiamo un robot – Il progetto e la sfida. Rassegna Istruzione, Volume 4, 2010-2011
- [2]. LabVIEW Graphical System Design – From Kindergarten to Rocket Science, <http://www.ni.com/newsletter/50596/en/>
- [3]. K. Mayerová (2012). Pilot Activities: LEGO WeDo at Primary School. Proceedings of 3rd International Workshop Teaching Robotics, Teaching with Robotics. 2012. p. 32-39
- [4]. E. Romero, A. Lopez & O. Hernandez (2012). A pilot study of robotics in elementary education. 10th Latin American and Caribbean Conference for Engineering and Technology, Panama City, Panama. 2012
- [5]. <http://pepycambodia.org/>
- [6]. <http://k12lab.com/>