

Chapter 12

Implementation of the Arduino Platform as a Didactic Tool for the Teaching and Learning of Volleyball

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ABSTRACT

The objective of this project is the implementation of information and communication technologies (ICT) through the use of the Arduino platform in the training processes of basic volleyball skills, as well as the application of training for visual stimulation in secondary school students. The initiative arose when weaknesses in the students in terms of the practice of volleyball became evident. Methodologically, a quantitative research with descriptive scope was approached using pre-test and post-test tests. The results showed the progress of the participants in their skills and technical gestures. Similarly, it was shown that the Arduino platform is an effective tool for the development of skills in students, allowing them to encourage their autonomy in learning and in turn became a tool for teachers to innovate teaching methodologies in Physical Education.

INTRODUCTION

Physical Education has become an essential subject in school curricula; it has been shown that the stimulation of motor skills contributes significantly to the development of cognitive skills, as well as improving people's quality of life and generating spaces for leisure and good use of free time (Molina, 2018). It also contributes to the maintenance of a good physical and mental state (Fradejas & Espada, 2018).

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On the other hand, another of the aspects involved in Physical Education is the performance of high performance sports, which depends fundamentally on four basic components, which are: technical, physiological, cognitive and emotional (Hilman & Janelle, 2003). The levels of training and the importance of these components depend on the specific demands of each sport; thus, in sports where quick decisions are needed in changing environments, the cognitive domain is fundamental, while in sports with closed characteristics the technical component is the most relevant (McPherson & Thomas, 2008).

Volleyball has become a dynamic and popular sport worldwide, it is a team sport played since 1895 initiated by William Morgan (Stankovic, Ruíz-Lamas, Dušan, & Quiroga-Escudero, 2018). It is a game of multiform character due to the rapid change of situations that arise in its practice. These changes require adequate physical preparation, which as a consequence means health and also ensures the development of psychological and moral qualities (Kaplan, 1982). In accordance with its characteristics, it is considered an ideal sport to include in Physical Education curricula.

In Colombia, it has become evident that innovation and research projects in Sport and Physical Education have focused especially on the university sector, leaving aside training at an early age. Therefore, the present research was carried out in the Bolivar Departmental Educational Institution (IEDB) in the municipality of Ubaté in Colombia, with approximately 2000 students, distributed in a central high school and three alternate sites for preschool and primary school, the study population was located in the tenth grade students.

In the Bolivar District Educational Institution (IED), the tests and activities carried out with the students in the area of Physical Education showed deficiencies in the specific movements of reception with forearms, passing, serving and blocking. These deficiencies are reflected in the practical evaluations in the area of Physical Education. Thus, for a population of 16 tenth grade students, 8 males and 8 females, in the development of volleyball exercises, the following results were obtained: in “spiking” 28% success rate and 72% errors, in “receiving” 63% success rate and 37% errors; and in “blocking” 45% success rate and 55% errors.

The problem is accentuated by analysing the low results of the Institution’s representative teams in the different local and regional sports competitions. Thus, the results in competitions with the Colegio de la Presentación are 66% hits and 34% errors; on the other hand, 55% hits and 45% errors in the competition with the Escuela Normal Superior. There are several situations that have led students to poor performance in volleyball, which are summarised in the following table:

Table 1. Causes and effects of poor performance in Volleyball

<i>CAUSES</i>	<i>EFFECTS</i>	<i>CONSEQUENCES</i>
Deficient technical training, motor coordination problems	Low definition of the level of technical gestures	Poor reception with forearm Failure in high shots Poor effectiveness in the block
Lack of specific training programmes	Lack of knowledge of the use of ICT as a didactic tool in the training process	Lack of knowledge of the use of ICT as a didactic tool in the training process
Little use of ICT tools in the teaching and learning process	Disorganisation of work plans in the area of Physical Education and Volleyball training	Poor sporting performance. Low academic performance in the area of Physical Education

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