EDUCATIONAL ROBOTICS

INTRODUCTION

Educational Robotics is the generation of learning environments based primarily on the initiative and activity of students.

They may conceive, design, develop and operate various educational robots that allow them to solve problems and challenges posed previously. Alongside they will facilitate learning in different curriculum areas naturally and spontaneously.

A robot is a device that is built to perform actions independently and interact with its environment. Must be able to move and react on their own. If only control their actions, it is only a toy remote, but if the device can do things like studying their environment, responding to obstacles such as chairs or walls, and hundreds of other activities without the help of his human creator, then we have a robot.

Building a robot requires knowledge of mechanics, to assemble your building; knowledge of electricity, to give mobility; knowledge of electronics, so the computer communicates with the robot; and computer skills, to develop a program to control the robot.

Educational robotics creates optimal conditions for learning in different fields of knowledge.

As a result, educational robotics can promote research and development level of creativity, the ability of abstraction, the development of systematic thinking, structured, logical and formal, interpersonal relationships, the habit of teamwork, allowing teachers activities that develop motivation, memory, language, mathematical logical thinking and the development of science and technology integrating knowledge, skills and attitudes of the National Curriculum Design (NCD).

OBJETIVES

The objectives of the course for students are:

- Be actively involved in their own learning process.
- Develop scientific and engineering intuition.
- They enhance their research skills and problem solving, as well as reading, writing, presentation skills and creativity.
- Build self-thinkers who are also able to appreciate the value of self-motivation and feeling with resources.

- Allows you achieve your goals becomes an habit.
- Become an autodidact.
- Promotes the ability to solve problems using strategies, focusing on the logical, analytical reasoning, and critical thinking. This ability is the basis of many scientific fields as well as other professional areas.
- Develop logical-mathematical intelligence applying numerical calculations and following logic programming patterns.

- Develop their spatial intelligence, appreciating the image and sensitized to color, line, form, shape, space and their interrelationships.

- They develop their physical-kinesthetic intelligence to do construction work using the sense of touch with perception measures and volumes.

- They develop their linguistic intelligence to expand vocabulary and effectively using technical words sustaining their work.

- They develop their interpersonal intelligence through socialization in collaborative work and teamwork.

- Develop their creative abilities and their manuals and construction skills.

- Develop their ability to learn in a fun way, arousing their curiosity and interest in scientific and technological principles that govern the world around them.

- Develop their communication and research skills.

For all the foregoing, the course of educational robotics we offer, meet the following objectives defined by the Ministry of Education, Royal Decree 1513/2006, of December 7, by which the minimum teachings for primary education are set:

- To develop individual and team work, effort and responsibility in the study, as well as attitudes of self-confidence, critical sense, personal initiative, curiosity, creativity and interest in learning, and entrepreneurship.

- Develop basic Maths skills and initiative in solving problems that require elementary operations of calculation, geometry and estimates, as well as being able to apply them to situations in everyday life.

- Initiation in the use, for learning, of the information technologies and communication, developing a critical mind to the messages they receive and produce.

- Use representation and artistic expression and start to build visual and audiovisual proposals.

- Know and use appropriately the Spanish language and, if any, the official language of the Autonomous Community and develop reading habits (in cases where the subject is taught in Castilian).

- Acquire, in at least one foreign language, skills to enable them to express and understand simple messages and function in everyday situations (in cases in which the course is taught in English).

1.- Basics project

- Knowing the LEGO WeDo KIT.
    - o   Pieces
    - o   Motor
    - o   Tilt sensor
    - o   Movement sensor
- Introduction to Scratch software.

2.- Introduction to mechanics

- Simple machines. Physical principles.
    - o   Levers
    - o   Wheels and axis
    - o   Gears
    - o   Pulleys
- Action - Reaction
    - o   Mobility by reaction of the motion sensor
    - o   Mobility by reaction of the tilt sensor

3.- Design and programming of robots

- Level 1 – Simple robots
- Level 2 – Medium robots
- Level 3 – Advanced robots
- Level 4 – Complex robots

4.- Programming practices

- Loops
- Conditionals
- Variables
- Objects and environment
- Multiples objects
- Using variables for communication between objects
- Programming of simple games
- Game Programming interacting with simple robots

LEGO WEDO

1.- Basics project

- Knowing the LEGO WeDo KIT.

Tools

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LEGO® Education WeDo 2.0 Bluetooth is the new proposal for children to discover the sciences. Through project-based learning, students explore, create and share their experiences in the natural sciences, the Earth and the space, physics and engineering.

WeDo 2.0 maintains the same essence of the original WeDo expanding its possibilities. Now students construct robots with simple sensors and a motor that connects wireless to computers and program their behaviors with a simple tool, it is easy and fun.

On the other hand, the LEGO Education WeDo 2.0 FULL application lets you explore large science projects, including engineering, technology and computing. Incorporates a library of projects that we have expanded with a great variety of designs, oriented to scaled learning.

Thanks to Bluetooth 4.0 technology, the robots created by the students are free to move without the need to being connected to the computer by a USB, so the possibilities increase greatly, creating robots that can interact between eachother.

WeDo 2.0 Tools

What does the KIT contain? 280 Parts, or a medium engine, or a tilt sensor, or a sensor movement, or a container of sorting tray and labels, Initiation to Lego software Education 2.0.

Method of work

Each Kit is designed to be worked in pairs ⬚ Labels will facilitate the arrangement of parts, operation with AA batteries for Smarthub power supply.   Free Software: Using Bluetooth 4.0

Features

Lego Wedo 2.0 is a second stage in learning; the components are different from those used with original Wedo thanks to Bluetotth technology 4.0 it is possible to connect up to 3 smartHub with a single device

Examples

DESIGN OF 3D VIDEO GAMES WITH KODU

Kodu is a visual programming language for creating video games. Provides simple tools to create 3D landscapes, control lighting, camera, create objects, characters, etc. Kodu's programming involves the selection of mosaics, programming in Scratch style blocks.

Main Features

Kodu provides an end-to-end creative environment for the design, construction, and reproduction of their own games. Using a high level language that incorporates real-world primitives: collision, color, vision...
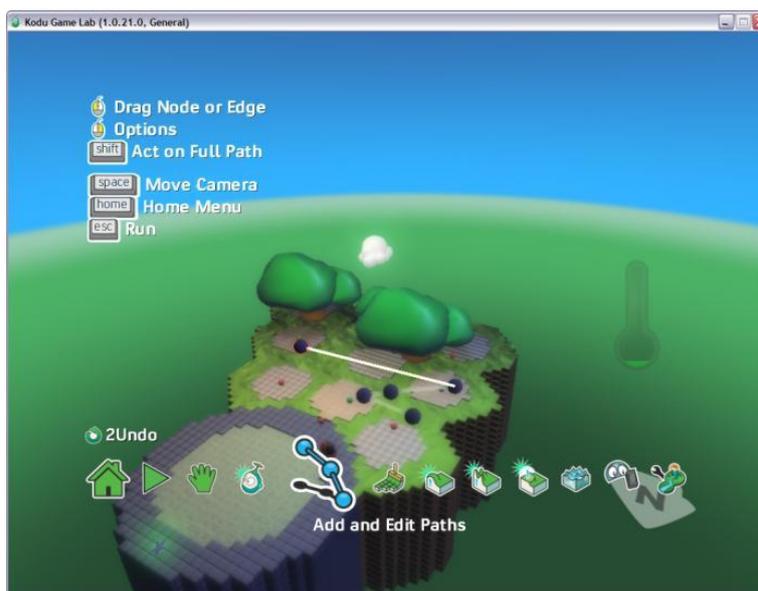
Design

This simplicity is achieved by placing the programming task in a quite complete simulation environment. Students should design the world in which all actions of the game are developed. From mountains, to rivers, creating objects, which they will behave in one way or another depending on the interactions we design.

Everything is done through a multitude of visual menus in which to choose carefully the actions and events that we want to occur.

Advantages

- It seeks to stimulate the creativity of children.

- It is a tool for the creation of a great narrative wealth (development of plots and stories of adventures mixed with problems to solve in video games).

- Kodu proves that programming is a creative medium.

- It also helps children with critical thinking, breaking a complex goal in manageable steps, and to go through the design process, an approach applicable to all academic subjects, business and personal relationships.

- Students learn to use logic, creativity, cooperation and also programming.

Examples

The didactic toy Robo Wunderkind design is intended to introduce kids into robotics and coding from the age of 5. They are modular robots as simple as Lego pieces in appearance but with the plus of electronic components in their inside which when joined together connect to each other.

In fact, the Robo Wunderkind modules are compatible with Lego pieces. Same as Lego kits, shape and sizes of colourful Robo Wunderkind modules, together with the way in which the robots are programmed are very appropriate for the smaller children.
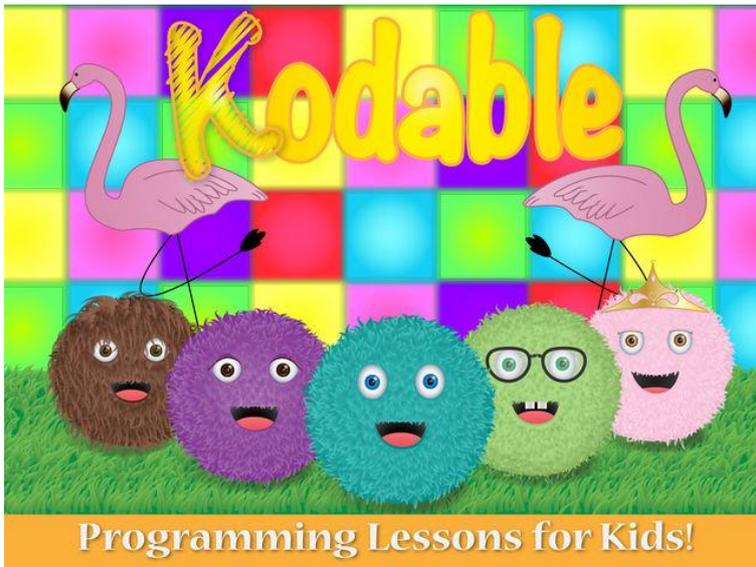
There are 14 types of sensors and motors in total, which combined together in different ways, enable us to create robots capable of carrying out diverse tasks: to move avoiding obstacles, making musical sound when someone comes close, to react to the sound of a clap, record and reproduce messages, move towards or away from light, to solve puzzles,...

Depending of modules being used the resulting robot may be programmed through a visual app in which coding is done by dragging and releasing the coding blocks associated to the functions of each module. The app connects to the modules through the mobile´s Bluetooth connection or the iOS or Android tablet. Modules are compatible with Scratch, the MIT coding language focussed towards youngsters and kids, or anyone whose desire is to step into coding.

Coding software in which students will have their own user password which will enable them to: solve problems in sequential steps, add loops, learn how to use functions more than once to create a smarter code, combine functions and conditions or to learn how to debug mistakes or to use critical thinking to detect and solve future mistakes.