

LEARNING, ROBOTICS AND CULTURE: A PROPOSAL FOR RURAL DEVELOPMENT

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Rural education throughout the world, especially in developing countries, has been approached in different ways. Some approaches follow too close urban education models that provide future opportunities for children, but forget the rural community needs; and others, serve only the rural community needs, leaving children with few opportunities outside the rural setting. The goal of this proposal is to study how robotics and other digital technologies can enhance student learning, while also improving rural community life; and also to explore how the relationship between learning, technology, and culture can be employed in proposing new alternatives that can close the gap between current rural and urban education. In this paper, I will describe some aspects of the proposal and some example projects made by the teachers and children during some workshops done recently in a rural community in Costa Rica.

INTRODUCTION

The development of the community is reflected in the efforts designed to improve the economic, social atmosphere and of life of the community (Miller, 1995). Nevertheless, community development specialists have focused on the economics, ignoring the other aspects of development and the interrelation of such. What would be the appropriate strategy and tools for an integral development of the community in a rapidly changing world? In this paper, I briefly present an attempt to solve this question by proposing a methodology of work that looks to build strong school-community relationships.

THE PROPOSAL

The research methodology that I am proposing for this project combines the theories of Participatory Development and Constructionism. In one hand, some of the underlying elements of Participatory Development theory will be used to approach the community and create a team that will support and continue the work at the local level. On the other hand, Constructionist methodology of work will be used as mean to engage people in building their own knowledge and thus, creating their development.

Participatory Development is a process anchored to local values and knowledge, defined and facilitated through the participation of those whose lives are most directly affected (Piciotto, 1992; Rahman, 1993). It covers and builds upon concepts such as community, religion, sustainability and empowerment. I will operate on the principle that community-based development is a participatory process most effectively approached in a bottom-up fashion. Constructionism is

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both a theory of learning and a strategy for education (Papert, 1980). It builds on the "constructivist" theories of Jean Piaget, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed by the mind of the learner.

One of the more important aspects of this proposal is the *curriculum*, which I called "evolving curriculum". The name evolving by definition refers to the nature of one being flexible and dynamic, and remaining in continuous change. The proposed curriculum, including its structure and initial projects, will keep evolving as the project continues at each of the pilot sites. The structure for the curriculum is built on the three main pillars: 1) community needs; 2) the current curriculum; and 3) strategies for development.

A key element to the success of this proposal is the creation of the appropriate *learning environment*. Ideally, the environment should allow enough freedom so learners can work on an immersed project-based learning (Bers & Urrea, 2000). By project-based learning I mean that learners can choose a project within a proposed theme of work. By immersing learning I refer to the notion that learners immersed themselves in the learning process by having a lot of time devoted to play and to explore their ideas in depth.

The use of *construction toolkits* that can support children and adults learning process is another important element of the proposal. I believe that the use of technology that allow people to build all sorts of artifacts as well as program them to interact with the world through sensors and motors is the first step even before introducing the elements of the curriculum. The proposed technology for the project is called LEGO® Mindstorms. It is a small computer embedded in a LEGO® brick. The Mindstorms brick has been under development for almost 12 years. It has been the result of the collaboration between LEGO® and a group at the MIT Media Lab lead by Fred Martin. The Mindstorms brick is an autonomous microcomputer that can be programmed using a PC. It uses sensors to take data from the environment, process information, and power motors and light sources.

EL RODEO, A RURAL COMMUNITY IN COSTA RICA

There are several sites for the RURAL project in Colombia and Costa Rica. El Rodeo, the community I am working with in Costa Rica, is a small community near the town of San Marcos, north of San Jose. The computer used for this site are part of a project called LINCOS (<http://www.lincos.net/general/frame.html>). The first effort to work directly with the school and the community started on spring 2001. I develop several workshops, which will be described briefly in the rest of the paper.

During the first workshop, I worked with the school principal, 4 teachers and few of their children who came to different sessions. I started by explaining the vision of the project and my interest on collaborating with the schools teachers. The rest

of the workshop was mostly dedicated to work on a project using all the elements I have given to them, including the vision of the project. They formed groups and built projects, which they presented at the end. I asked them to think how they could use what they built to work with the groups of children at school. An example project that the kindergarten teacher and her two sons built was a smart classroom. She wanted to use the smart room for energy conservation, and to talk to the children about saving electricity and water. This project was pretty much related to her everyday life. She mentioned that she is always turning lights on and off and checking faucets, so water doesn't get wasted.

During this second workshop, I worked with 25 children from 3rd and 4th grades. We started with a games, and discussion about different aspects of their community. The children decided all the project they wanted to work on based on our discussions: some of them were related to transportation, which is a big issue for the community; others ones had to do with recreation, which is very limited; other groups worked on artifacts that need motors , they built a refrigerator, a washing machine, etc; and some of them spent time creating landscape with art materials and things they picked from the garden.

CONCLUSIONS

- It is important to establish different roles for the people involved with the project at the different levels.
- The School Plan will begin to incorporate some of the ideas we worked during the project. We identified a module on social issues and values and other one about conservation of resources, which will be designed in the near future.
- The technology and the programming language still difficult for not very experienced users. I am looking to include other options that support different levels of expertise, both for the hardware and software.

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