Chapter 1

Introductory Chapter: Science Education - Research and New Technologies

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1. Introduction

The scientific education has passed through many transformations in the last years, but the main one is the rise of cheaper and more efficient computers, allowing teachers and students to use it in a discriminated way. With this easy access, other devices like cell phones and similar communication products emerged allowing the rise of the information and communication technologies (ICTs). In this book, we will have chapters that present various use types of the ICTs applied in teaching, allowing a pleasurable and interesting reading to this theme, showing researching works from many nationalities that converge to a common theme which is the technological education, and demonstrating that this labor is a world class issue and not just a local one.

Nowadays, the new ways of seeing and obtaining information of the teaching processes have triggered a new teaching approach, allowing the incorporation of new teaching methodologies to the process of teaching. These new methodologies include flexible and creative strategies and resources that enable new models of interaction between teacher, student, and community. That positively influences the whole process, also being experimented in the formation of several other professionals, not only for science teachers.

These new methodologies should provide and/or provide these professionals with new assistance, management, teaching, and research skills, in which the student should be encouraged to develop skills, criticality, and creativity in their actions.

A more critical look at the use of technologies in education and its various resources bring us new ways of seeing and obtaining information, transforming them into useful products for learning, an aspect that inspired the work presented here.

The rapid evolution of ICTs has created opportunities for networking environments with enormous amounts of information. In this scenario, people can easily find everything that interests them, favoring the use of these tools in several sectors, including teaching, research, and extension, thus recreating new models of interaction between humans.

The teaching of content in the area of exact and land sciences is undergoing changes in several aspects. This is the content presented and its relation to other contents of other areas, such as polytechnic teaching, as well as in its presentation to students, such as video lessons, computer applications, and new hardware, such as high-resolution screens and or Arduino.

These new resources are being inserted in the educational context and, as observed within schools, are still subject to controversy and little use; this has been occurring for several reasons, from the lack of teacher training to the economic factor; but one of the main causes is the lack of pedagogical innovation in educational systems.

In this context, there remains a gap to be filled with new research that seeks to solve these problems, collecting real data, and presenting more appropriate solutions and tools.

Thus, we are led to think of some disciplines that are the main causes of this controversy, as well as the low motivation of the students; we can observe this in the exact sciences, as well as the use, or lack, of technologies to encourage students in the study of these disciplines.

The use of technology in education is not restricted only to computer, pen, whiteboard, and slide projector, for example, other technologies, that already are or may be inserted in the classroom, can also be considered. But what is most striking is the computer "because it is a tool not only of classroom study, but also a tool of work after school" and is still the great responsible for the doubts and inquiries of most teachers of basic education.

Another problem commonly encountered in high school classrooms is the teaching of the Physics, which is often a problem for teachers, and it is common sense among students that the discipline is difficult. It is also noted that Physics is not very appealing to high school students, mainly because of the difficulties presented to them while studying, causing serious problems to the students in the course of their academic life, even after entering university.

Computation, as a teaching and learning tool, has been developing throughout this century, with enormous advances in the area of software, such as implementations in the area of scientific visualization and in the development of computational calculations.

The evolution of concepts and new products in the area of hardware has also brought advances in teaching, but not all of these products are positively associated with the conceptual part, both in terms of content to be taught and teaching itself.

One of the questions about computing resources in schools that has been extensively debated is that, in addition to the obvious lack of trained human resources, the lack of application of these computational resources available in schools makes these resources idle. And this lack coupled with the lack of preparation of human resources in schools (not to say clearly of the teacher) ends up harming the application of harder contents to the detriment of an easy visualization of the same with the aid of the ICTs.

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In the formation of future specialists, computer education cannot ignore the reality of a society in which research and technological progress are based mainly on interdisciplinarity and transdisciplinarity.

Finally, certain practices, discussions, methodologies, and/or components that would aid in science classes should always be based on the day to day of educators, since education must be the gear that moves the evolution of the human being. Therefore, the incessant research on ways to facilitate teaching learning and/or improving the coexistence between teachers and students should be continuous.

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