COLLABORATIVE LEARNING OF ELECTRICITY BY IMPLEMENTING AN INTERACTIVE TEACHING

M. J. Quintas[1,2], P. Simeão Carvalho[2,3]

[1] Agrupamento de Escolas de Valbom, Gondomar, Portugal
[2] IFIMUP-IN, Rua do Campo Alegre, s/n, 4169-007 Porto, Portugal
[3] Departamento de Física e Astronomia, UEC, Faculdade de Ciências da Universidade do Porto, Porto, Portugal
quintas.mariajose@gmail.com; psimeao@fc.up.pt

Abstract

The use of interactive teaching materials is seen as a booster for better physics collaborative learning.

In this investigation we study how both laboratorial practice activities (LPA) and digital educational resources (DER), explored with interactive strategies, influence students' learning of electricity in some Portuguese schools. Students were divided into experimental group (EG) and Control Group (CG).

The results are:

(1) Students learn better when this practice of teaching and learning is used systematically in schools;

(2) both teacher training and interactive materials are necessary to promote collaborative learning.

Introduction

Our society has changed, as a result of revolutions in technology, in economy, demographic fluctuations and politics. New challenges arise to schools and especially teachers, in order to maintain their students mentally active in class and foster enabling environments to reach their own learning.

Several investigations (Lopes et al, 2009; Mazur, 1997; Novak et al, 1999; Crouch et al., 2007, James, 2006) have show the advantages of collaborative learning.

The effective implementation of teaching and learning strategies will overcome the barriers presented by traditional methods, leading to an effective conceptual evolution and skills´ development.

The Research

In this work we discuss the results achieved in teaching the unit: "Electricity and Electrical Circuits" - 9th grade of basic education, in two schools in the district of Lisbon, Portugal.

The Control Group (CG) followed a traditional methodology in the teaching of electricity without any application of interactive teaching strategies.

The experimental group (EG) experienced interactive strategies based on DER and LPA, using active methods such as *Peer Instruction* whose main focus is based on questioning, and *Just-in-Time Teaching* which has the prior knowledge of the students as a guideline in each class architecture.

Evaluation

The tools used to collect data came from multimedia tasks, inquiry-based activities and interviews, in the way explained in the following table.

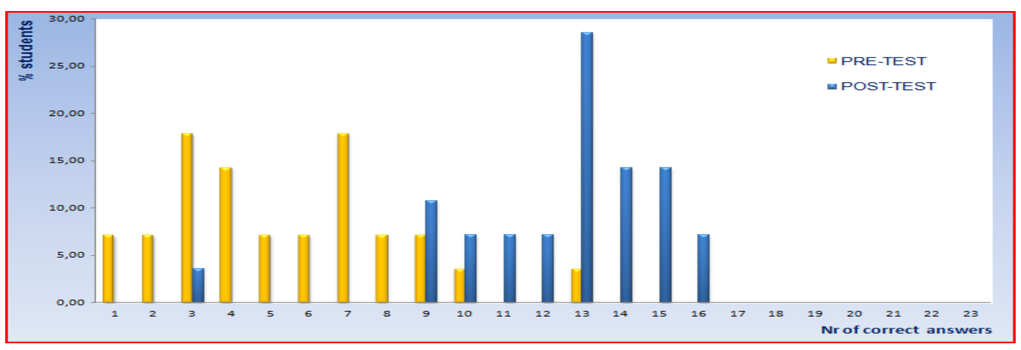
Assessment tools	EG	CG
Student characterization form	X	X
Conceptual Pre-test	X	X
Conceptual Post-test	X	X
Survey	X	
Interview	X	

The evaluation conceptual test of 23 questions of closed answers was drawn up, based on the works of Engelhardta & Beichner (2004) and and Thornton & Sokoloff (2005).

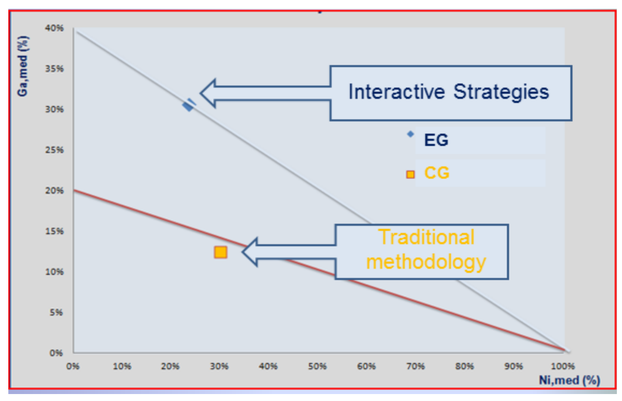
Results

The results of conceptual test aimed to assess the level of conceptual evolution and learning of the students.

The figure represents the percentage of EG students according to the number of correct answers, obtained before and after testing. **The percentage of students increased significantly from the pre to the post-test.**



The figure shows the learning gains for EG and CG. The level of the learning gain was much higher for the EG than that achieved for the CG.



The relative learning gain of EG is close to **40 %.**
The relative learning gain of CG is of about **20 %.**

These results are consistent with those related to learning with traditional methods and interactive methods.

Conclusions

The difference in learning for EG and CG is relevant and shows the influence of several combined factors:

- ✓ **adequate training in teaching practice;**
- ✓ **educational resources explored;**
- ✓ **teaching methodology.**

These results show that t**he application of an interactive teaching practice by adequately trained teachers**, to enhance the exploitation of resources using interactive strategies, **is more advantageous to students' learning and that can be reflected considerably in school performance.**

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