

Betting on innovation and experiments

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ABSTRACT

This work proposes a series of activities aiming at uniting two methodological objectives; achieving a competency-based learning that enhances autonomy and participation of students and promoting cooperative work approaches that encourage social abilities and solidarity. This work proposes a series of experiments and practical demonstrations in combination with innovative teaching-learning approaches and the use of information and communication technologies (ICTs) as useful tools. These activities are directed to the acquisition by students of a set of knowledge pertaining to the Subject "Physics and Chemistry" in the 4th grade of Secondary Education.

CCS Concepts

• Social and professional topics~Model curricula • Social and professional topics~Student assessment • Social and professional topics~Adolescents • Applied computing~Collaborative learning

Keywords

Innovation in Education; Experiments in Education; ITCs; Physics and Chemistry.

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1. INTRODUCTION

1.1. Experience in Science subjects

Physics and Chemistry in 4th Grade of Secondary Education in Spain is an area of knowledge which aims to literacy of students (15-16 years old) in the basic ideas of the scientific method so that they are able to understand the world around them and solve everyday life problems following its steps. Therefore, experimentation should be very much present in these Subjects. Theoretical contents are necessary indeed, but it is not less true that these concepts ought to be experimented, highlighted in practical experiences, related to the daily lives of students and discussed. All these activities are necessary for the teaching-learning process to be complete. It does not suffice the mere knowledge of what happens or how will something function, it is also needed experiencing this knowledge. Banish memoristic rote and passive learning processes and promote instead active and meaningful processes is the key to achieve this goal.

Usually, active learning methodologies are closely related to student motivation, a basic requirement to build meaningful knowledge. However, effectiveness of active learning is not restricted to these motivational aspects [1], but also learning psychology has shown that with such a learning, long term knowledge is easier achieved. Edgar Dale, set out the percentages of what after two weeks is retained from what we are taught, 10 % of what we read, 20 % of what we hear, 30 % of what we see, 50 % of what we hear and see at the same time and 90 % of what is explained and made [2].

In addition, active learning approaches have many other advantages against more passive learning approaches, such as [1]:

- They maintain student's interest and attention over longer periods.
- Active lessons increase student responsibility.
- Experimental lessons encourage interest in science.