

Diagnosis of difficulties in of handing variables and drawing conclusions by means of the reports of an initial experimental activity – Material Dimension

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1. Abstract

The aim of this paper is limited to the assessment of some science process and skills that prospective Primary teachers (PPTs) should develop. Sixty three PPTs were initiated in scientific practices through Inquiry based Learning (IBL) in groups. This training was started with the so named guided experimental activity (ExA₁): *'Stratification and segregation by mechanical agitating: Which takes precedence: the heavier or the lighter? Don't push yourself too hard, shake them and they'll detach themselves!*. Instrument for data collection consisted of an open ended questionnaire titled *What have we learned?*, one questionnaire per group, completed during the class following the implementation of the ExA. The results showed that most of the groups identified the relevant variables that may affect the segregation of the objects in the shaking granular material. But vast majority of them failed to set the control of variables carried out. Only a few of them were able to depict the experimental design developed. And they show only partial coherence when drawing conclusions.

Keywords: inquiry-based learning; practical works; scientific practices, control of variables; Prospective Primary Teachers

2. Introduction and objectives

This work is part of a half-way-developed project directed to the initiation of (PPTs) to the processes of scientific inquiry throughout ExA. Particularly, the project deals with the successive implementation of investigating ExA so that both the required autonomy and level of openness of the inquiries to be carried out may grow. This article is a follow-up to previous contributions (Criado et al. 2016^a, Criado et al. 2016^b) of our work concerning inquiry processes.

The aim of this paper is to assess the main achievements of PPTs in some inquiry skills in an initial ExA developed to diagnose their difficulties in IBL. The initial performance level on identifying variables and its control, on pinpointing the experimental design developed, and the coherence of drawing conclusions are the results presented this time, since problems and hypotheses issues concerning this initial ExA have already been communicated (Criado, et al 2016^a).

3. Methodological aspects

Sixty three PPTs (organized into 17 groups) were trained to develop scientific practices. This training was started with the so named teacher-guided ExA: *'Stratification and segregation by mechanical agitating: Who takes precedence: the heavier or the lighter? Don't push yourself too hard, shake them and they'll detach themselves!*', Criado & Garcia-Carmona (2011). It was implemented with the help of a paper and pencil task sheet. Instrument for data collection about the effectiveness of the ExA consisted of an open ended questionnaire titled *What have we learned?*, one questionnaire per group, completed during the class following the implementation of the ExA. The data were analysed by combining methods of inter- and intra-rater analysis.

4. Results

The results showed that most of the groups identified weight, density and volume as the relevant variables that may affect the segregation of the objects that sink or emerge in the shaken granular material. But vast majority of them fail to evoke, to set the control of variables carried out the previous class. One third of the groups were able to depict the experimental design developed to inquiry which of the variables governs the emerging objects process. And finally, the groups showed only partial coherence when drawing conclusions.

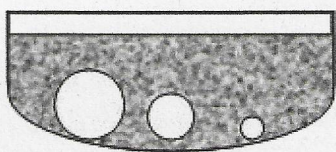


Figure 1. Same (and light) material objects shaking test

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