Progressions of prospective primary teachers skills in handing variables and drawing conclusions when they are trained by Experimental Activities – Material Dimension

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Tuesday, 8 October 2019, 14:00-16:00, KG5 103

1. Abstract

Inquiry-based learning (IBL) strategies are dealt with in our research about Experimental Activities (ExA) in prospective primary teachers´ (PPT) Science training. To determine the quality of a sequence of several ExA programed a pilot study was conducted. This paper shows some of the results obtained. Sixty-three PPTs were initiated in scientific practices. Implementation was ensured by progressive scaffolding, instruction and interim data. Instrument for data collection consisted of the open-ended (but oriented) reports of the groups about the activities done. Several aspects of IBL were studied with our project: Problems, hypotheses, variable identification, control of variable strategy (CVS), and degree of coherence when drawing conclusions (CinC). This paper concerns the latest. Results showed that the CVS, as well as the CinC were difficulties detected in most of the groups at the beginning of the training program. 'Ad hoc' instruction and scaffolding were implemented with the aim of addressing each of this difficulties. But growing demand for high order processes were required throughout the implementation of the ExA sequence, as less teacher-guided ExAs were done. Competence skills in IBL of PPTs improved to a different degree depending on the familiarity with the topic addressed in de ExA

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 of our previous work (Criado, García-Carmona & Cruz-Guzmán, 2016). The aim of the current paper is to show intermediate gains of PPTs in some inquiry skills such as CVS as well as CinC in the course of two intermediate tasks developed with special scaffolding to solve their first detected difficulties.

3. Methodological aspects

Sixty three PPTs (organized into 17 groups) were trained to develop scientific practices. This training was started with a guided ExA_1, whose analysis showed the following goals to achieve: 'improving appropriate wording in problem formulation', 'clarifying the CVS' and 'being consistent when

drawing conclusions from the current ExA developed'. This issues were addressed in a two-step-approach: 1) A task of preparing a data table for data collection to inquiry about the influential factors in the germination of seeds (legume seeds); 2) New IBL ExA involving chromatograms of felt tip pen inks (ExA_2).

4. Results and Discussion

Interim data revealed that both CVS and CinC were difficulties detected in most of the groups at the beginning of the training program. So 'ad hoc' instruction and scaffolding were implemented with the aim of addressing each of these emerging difficulties. But growing demand of high order processes were required throughout the implementation of the IBL-ExA sequence, as less teacher-guided ExAs were done. PPTs competence skills in IBL improved to a different degree depending on the familiarity with the topic addressed in de ExA. All the groups were able to prepare a data table for data collection to inquiry about the influential of light and water irrigation in the germination of legume seeds. One third of the overall groups could set their owns problems in the chromatogram ExA and the half of them just kept the problem example proposed by the teacher. Most of the groups formulated reasoned assumptions in the role of founded hypotheses. Only one third of the sample explicitly recognized to have designed a CVS, confirming what Schwichow et al (2015) report, and Schichow suggests: returning to the issue on several occasions is needed. However, CinC results quite satisfactory in the chromatogram ExA. This reinforce the necessity for increased training in various aspects as CVS, and to develop a persevering attitude in reaching conclusions, returning to the questions raised and the hypothesis formulated at the beginning of the process.

Acknowledgements

Project EDU2017-82505-P (2018-2021) "Formación de Futuro Profesorado de Niveles Elementales en los Procesos de la Ciencia y su Didáctica", (*Training preservice teachers of elementary levels in Scientific Practices and its Pedagogy*). Proyectos I+D, Ministerio de Economía y Competitividad. https:// investigacion.us.es/sisius/sis_proyecto.php?idproy=28499

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