

Research-oriented Intervention Module on Magnetic Phenomena for Perspective Primary Teachers

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Abstract. A study on the Perspective Primary Teachers Education has been carried out on three different levels: the way to plan and carry out it, the learning knots, the role of didactic practice. Being involved in learning paths and directly exposed to learning knots prove to be an effective training in which perspective teachers develop their didactic skills in terms of Content Knowledge and Pedagogical Knowledge. Main results are here presented.

1. Introduction

Perspective Primary Teachers (PPT) Education on scientific area and in physics in particular is a challenge on many plans. In the Pedagogical Content Knowledge (PCK) theoretical framework [1], not only a knowledge in the PCK perspective, but an integration of education and subject related aspects is needed. As we know, perspective primary teachers often have difficulties in Science and, in particular, in Physics. Physics is felt as not familiar and it is loved not so much. On the contrary, teachers need to develop skills as listed by Dublin Descriptors and inspired to the national guidelines by MIUR for the scientific curriculum, with modalities as described in the related international documents. A PCK-based research requires teachers to be familiar with contents and specific methodologies, to recognize learning knots and be exposed to them. Research literature on physics education underlines that a great part of learning difficulties of students are in common to the teachers and, then, become professional problems in approaches and strategies [2,3]. In addition, PPT need to become aware on the way in which conceptual knots emerged in practice, planning specific intervention activities with children, implementing them and analysing learning outcomes [2]. The model in which the approach is the PPT engagement in research based Teaching/Learning Paths to identify together subject related conceptual aspects and the educational way to address them with specific strategy, methods and instruments [2-4] appear as a fertile referent to address Magnetic Phenomena. The main learning knots addressed in literature on magnetic phenomena [5-10] are the conceptual subject related goals for learning outcomes in the PPT research based intervention module.

The research carried out is to lead Perspective Teachers to gain the competences to create learning environment for children in school and to discuss with them reasoning and spontaneous ideas to build a scientific interpretative way of looking phenomena.

2. The Research

The sample consisted of 100 students of the 4th year of primary teacher education course at the University of Macerata and of 100 students of the 3rd year of the analogous physics education course in the University of Udine.

In Macerata, after an introductory section in which perspective teachers were involved in some learning paths on magnetic phenomena, a discussion on learning knots and in a reflection

on the main conceptual aspects involved in the the topic, they were asked to plan and carry out a teaching intervention activity in the framework of Conceptual Lab for Operative Exploration (CLOE Labs) [11] with primary students. The tackled knots are: A) exploration of interactions between a magnet and: A1) an other magnet, A2) ferromagnetic objects, A3) objects done by other materials, A4) a compass [5]. B) reciprocity of the action being not in contact. C) the compass is a magnet. D) magnet ordinary suspension. E) the space around a magnet: magnetic field and their representation through field lines [6];. F) superposition of fields [8,9]

In Udine, two different kind of intervention with children were organized: one similar of those in Macerata in CLOE Labs of GEI exhibition by 8 students and another by about 100 students in normal classrooms of primary schools. All interventions of PPT with childrens last 2 hours.

3. Results and Conclusion

The results of this study is on different plans and offered hints on how to organize PPT education on magnetic phenomena offering significant data on: 1) How perspective teachers choose and select topics and path; 2) Which conceptual aspects do they consider crucial and hard to be understood by primary students; 3) How they plan to manage their interaction with students; 4) How PPT develop didactic skills and Pedagogical Content Knowledge (PCK) in Physics Education. Being involved in learning paths and directly exposed to learning knots prove to be an effective training in which perspective teachers develop their didactic skills in terms of Content Knowledge and Pedagogical Knowledge.

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