



Encouraging Science Corners from the Primary Education Pre-Service Teachers

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Abstract

This paper presents a formative experience with 58 Pre-service Primary Education teachers taking the subject of Science Education in the third year of this degree at the University of Málaga (Málaga, Spain), whose main objective was that they actively experimented with and evaluated the work-based methodology in corners applied to learning scientific knowledge. Corners are delimited spaces in the classroom where students, individually or in small groups, carry out different learning activities simultaneously. This methodology is widespread in early childhood education and is diluted in the primary stage, so it should continue to be promoted. The activity was developed in three stages. First, the students had to create a corner on scientific knowledge assigned by the teacher and present it to their classmates as an educational fair. Secondly, students had to improve the corner activities with their acquired knowledge. Finally, they must present improved corners at a second fair to promote future transfer to the classroom. Initially, the activities in the science corners were mainly centred on a traditional methodology. However, the final situation was very different, presenting much-improved corners with spaces where those who visited them were the protagonists driving their learning. Students completed a questionnaire before and after the activity to assess progress in their perceptions of the science learning achieved and the emotions felt. It is possible to appreciate an essential evolution in comparing responses between the two moments regarding the perception of the learning of scientific knowledge experienced by the participants. Thus, most seem to know little about the subject in the initial corners. In contrast, they expressed much scientific knowledge in the final corners, or so much that they would feel able to explain it to someone else. Concerning emotions, the future teachers were initially interested (35.5%) and concentrated (23.0%) on their participation in the science corners. However, it is noteworthy that while they showed similar interest after the activity (29.0%), the emotions with which the future teachers faced their participation in the corners were more satisfied (17.1%) and concentrated (31.4%).

Keywords: Pre-service teachers, Science corners, Scientific knowledge, Emotions, Methodology

1. Introduction

One of the challenges of science education is to train future teachers in innovative methodologies that enable the construction of scientific knowledge in their students [1]. One way of achieving this is to experience these methodologies first-hand to analyse, from their role as students, different aspects such as the knowledge learning experienced, the possible difficulties in their implementation, or the emotions experienced during the realisation of the project [2,3]. Moreover, this last aspect seems fundamental to creating classroom working spaces that foster a positive emotional climate, essential for learning in general and the processes of reasoning and decision-making in particular [4].

In this sense, an innovative method that has proven to be very appropriate for promoting the learning of knowledge in different areas, including science, at an early age has been the creation of small learning corners or learning environments in the classroom. Science corners are small educational spaces dedicated to a topic where students can experiment, discover and learn something new based on their interests [5]. From these spaces, children learn significant as they build their scientific knowledge through learning by discovery [6]. In addition, they work in teams, coexist and relate to peers, and accept mistakes, among others. Science corners are also educational spaces that make it possible to cater for children's differences and get to know each child's learning rhythms and interests, and curiosities. For all these reasons, this paper presents a formative experience with Pre-service



Primary Education teachers whose main objective was that they actively experimented with and evaluated the work-based methodology in corners applied to learning scientific knowledge.

2. Method

This experience involved the participation of 58 Pre-service Primary Education teachers (85.0% women and 15.0% men) taking the subject of Science Education in the third year of this degree at the University of Málaga (Málaga, Spain) with an age range of 21 to 23. The experience was developed during three stages of two hours each as follows (figure 1):

Session 1: The groups were organised and the science corners topics were distributed in the first session. The topics were properties of matter; states of matter and their transformations; types and sources of energy; animals; plants; and systems and apparatus of the human body. In this session, the working groups had to create a corner on scientific knowledge assigned by the teacher suitable for Primary Education and present it to their classmates as an educational fair to teach some aspect of the given topic. In this way, the participants revealed their initial knowledge, both disciplinary and didactic. Then, the rest of the class could visit the initially designed different science corners. Each participant, once saw and realised a corner, had to answer two multiple choice questions: (1) What knowledge do you have about the topic addressed in the corner? (2) How did you feel during the realisation of the corner?

Session 2: The working groups improved the science corners by incorporating the different methodological orientations addressed in the theoretical sessions of the subject, such as the need to design the corners in such a way as to bring into play the scientific practices of inquiry, modelling and argumentation.

Session 3: Finally, in the last session, each group presented their environment again, and the process carried out in the first session was repeated so that each participant visited the same corners in which they had initially participated, although now in their improved version. At the end of their visit to each corner, they again answered the two questions posed.

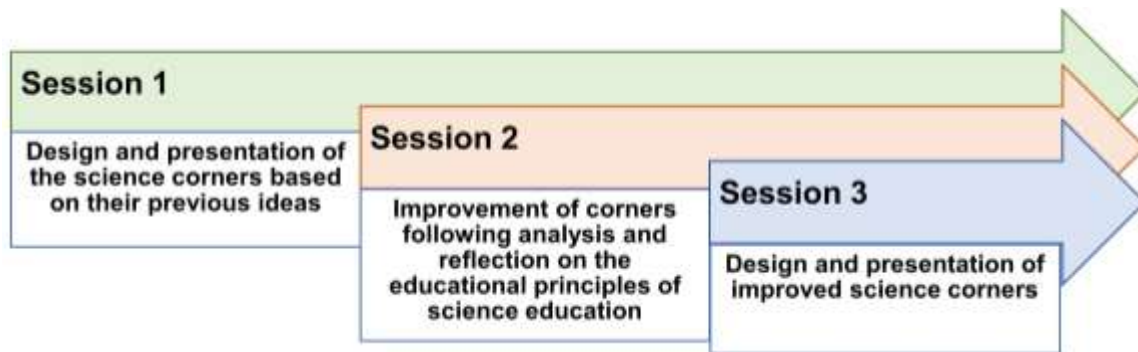


Figure 1. Stages included in the formative process.

A corner about the energy (A) and other about matter (B) are shown as examples in Figure 2.

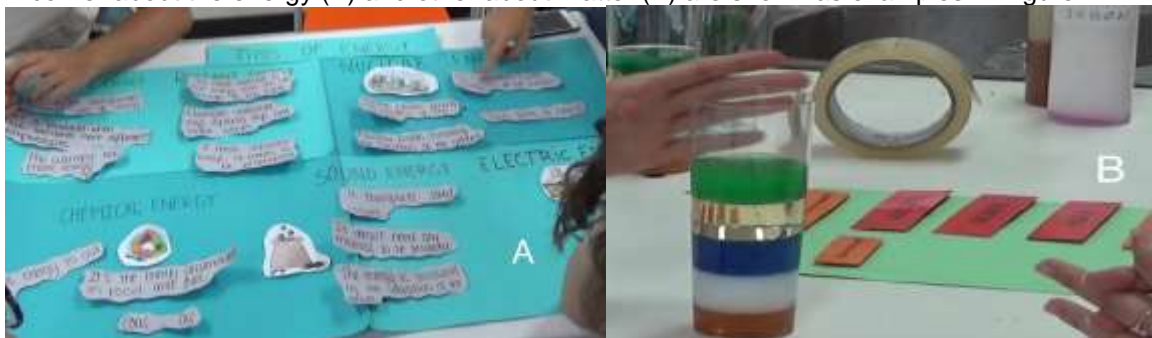


Figure 2. Examples of science corners.



3. Results

Initially, the activities in the science corners were deeply related to a traditional methodology. In other words, most participants were limited to listening to the explanations of those responsible for the corners' design. Therefore, in almost all cases, manipulation, experimentation, creation of arguments, etc., were not encouraged. However, the final situation was very different, presenting much-improved corners with spaces where the participants were the protagonists of driving their learning. For example, one of the groups initially presented and explained the circulatory system through a diagram of its most important elements, to finally improve its design by proposing to the participants the observation, manipulation and exploration of a pig's heart.

On the other hand, the students completed a survey before and after the activity to assess progress in their perceptions of the science learning achieved and the emotions felt. It is possible to appreciate an important evolution in comparing responses between the two moments regarding the perception of the learning of scientific knowledge experienced by the participants (figure 3). Most seem to know little about the subject in the initial corners (34.3%). However, in the final corners, they expressed much scientific knowledge, or so much that they would feel able to know very well or to explain it to someone else (73.0%).

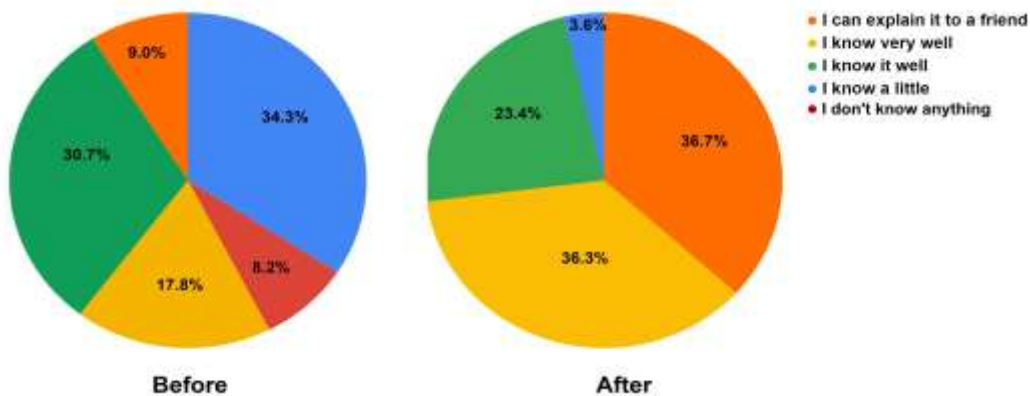


Figure 3. Before and after knowledge perceptions.

Regarding emotions, the starting point was an initial situation where most future teachers felt mainly interested (35.5%) and concentrated (23.0%) in participating in the corners but also expressed a certain degree of insecurity. This last emotion could probably be because they are not used to this kind of experience, as is evident in the following statement from a student: *"We were not very clear about what we had to do, and we needed a lot of help"*. However, it is noteworthy that, even though they showed a similar interest as in the initial situation (29.0%), the emotions with which the future teachers faced their participation in the corners were more satisfied (17.1%) and concentrated (31.4%).

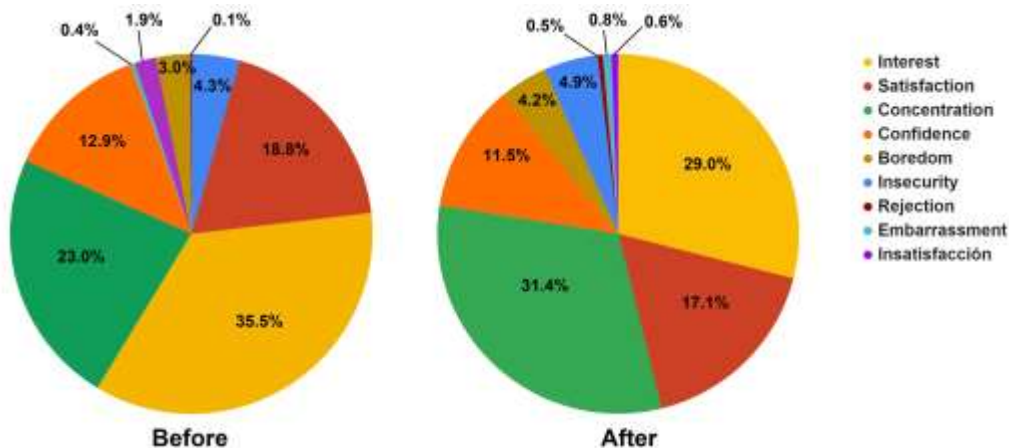


Figure 4. Before and after emotional perceptions.



4. Final considerations

In general, it is possible to affirm that the experience with future primary teachers focused on designing and implementing scientific corners has proved to be very appropriate for learning scientific knowledge. In addition, the initial insecurity with which these teachers had started, most probably due to their lack of scientific knowledge, has turned into other positive emotions, such as satisfaction and concentration in teaching and learning science.

From an educational perspective, this type of experience also helps future teachers to acquire competences to promote the construction of scientific knowledge in their students in a meaningful and motivating way while also fostering the learning of scientific skills and attitudes. In this way, it is necessary to highlight the importance of adopting approaches in which the initial teacher trainees themselves experience methodological innovations and therefore become aware of the educational benefits of adopting this type of approach in the classroom, as well as the emotions that their future students may face when faced with them. Only in this way will they be able to transfer their experience to their educational practice.

5. Acknowledgements

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