

Dialogic processes in science lessons: whole-class teaching and group-work about evaporation

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Abstract. This paper discusses students' learning regarding evaporation in a context of dialogic teaching. The data comes from an intervention study carried out in a Brazilian public school and comprises three lessons in which group work and whole-class teaching were coupled. The aim of the learning sequence was offering the students a dialogic space for building their knowledge. Our preliminary shows that the students were able to talk about the evaporation process very generically and related it to everyday experiences. In addition, the teachers' role in deepening and refining the student's understanding is essential to overcome the generality.

1 Introduction

In the last 30 years, much research has focused on the role of language in improving the quality of education; more specifically, it has shown the positive aspects of the dialogic approach on students' learning and participation (1). Moreover, small-scale interventionist studies have found that students can learn to talk effectively to solve problems together and teachers who participate in workshops or reflective dialogues can change their communication approach towards a more dialogic nature (2).

Researchers within this context usually divide the classroom setting into two scenarios when they consider space for dialogue. While whole-class teaching comprises lecturing and briefing and debriefing sessions where teachers take the role to guide the construction of knowledge, group work is a particular arrangement in which students can interact more freely and expose their ideas without evaluation (3). These settings promote different kinds of students' experience on learning.

Building on this body of educational research, this paper is related to a broad study aimed to promote dialogic teaching-learning as a way to improve Brazilian primary science. At this level, it was shown that teachers underperform in terms of the content of science and display naïve beliefs and attitudes towards the nature of science and technology. There is a lack of resources to carry out hands-on activities. As a result, science teaching appears just as a "collection of facts" (4).

So, to tackle these problems and to explore the adherence of a dialogic approach to Brazilian school culture, it was planned a small-scale, classroom-based intervention, facilitated by a three-month teacher professional development programme in a fashion of co-inquiry teacher-researcher partnership. The sessions were divided into three modules that address specific science contents and dialogic strategies. The participants formed a group of three upper-primary teachers (Year 5, age 9-10) and sixty students from the same school.

2 Methodology

In this paper, we focus on the second module of this programme that emphasises the yoke of **whole-class teaching** and **group work** in three lessons about evaporation based on the

materials of the *SPRinG* project¹. The lessons include a considerable amount of student talking and thinking and were designed to allow them to develop their own theories on the basis of their observations. The lessons were discussed with the teachers with a particular emphasis on the debriefing section when they should explore, compare, extend and challenge the students' ideas elaborated in the group work. The students completed two individual written assessments (pre and post-tests), two worksheets (as groups) and some participated in group interviews. The video and audio recordings (group work and whole-class) compose another part of the dataset. All this data enabled us to answer the following research questions:

1. What did students learn?
2. How did talk support the development of students' understanding?

The written evidence and the interviews were investigated through content analysis to characterise trends and patterns providing a relatively low level of interpretation.

The discursive episodes were transcribed and then it was carried out a sociocultural discourse analysis. Such analysis consists of a close examination of transcribed episodes of dialogue, in which categories might be generated and illustrated by selected extracts and then related to other instances (5,6). This focus enables researchers to search not merely for a particular word or discursive function, but also for whole forms of interactions. The main advantage is that the dialogue “remains in the data throughout the analysis and so the processes of the joint construction of knowledge can be examined in detail” (5). Thus, here, the focus is not only on the content of the dialogue or with the discursive functions of each utterance but also with the ways that the shared understanding is developed over time.

3 Results and conclusion

The construction of knowledge was described regarding how students develop the concept of “evaporation” in a context with little support of written materials such as text or notebooks. After the three lessons, the students were able to talk about the process very generically and related it with everyday experiences. They were also able highlighted the factors that can affect the process. However, it was problematic to develop the concept of particles. The teacher's role in pointing out contradictions in students' thinking and a right climate for dialogue is essential.

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¹ <http://www.spring-project.org.uk>