SKILLS THAT PRE-SERVICE PRIMARY TEACHERS' CONSIDER IMPORTANT IN ARGUMENTATION APPROACH

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Argumentation as a form of scientific discourse is a powerful tool that allows students questioning, justifying, and evaluating their and others' claims. In science education, transmissive teaching predominates and this leads to difficulties in students' construction of arguments and highlights limitations in teachers' pedagogical abilities in the management of this type of activities. Also, teachers' beliefs and perceptions have a big influence in the way they teach. Thus, the purpose has been to investigate pre-service primary teachers' beliefs of what would be the skills they need as a core to support argumentation in science classrooms, and what skills students can develop when participate in science lessons based in argumentation. Results show that Pre-service Teachers of Primary pay little attention to the skills they will need in order to manage different methodological strategies as debate, pair work or pair discussion, that support the argumentation approach. Moreover, they lack of awareness about what is a good argument and its components, besides scientific knowledge. These results are significant because they indicate a need in designing specific training programs to support teachers in acquiring knowledge and skills about argumentation.

Keywords: Argumentation, Pre-service Primary Teachers, Skills.

INTRODUCTION

Contemporary science education places a great emphasis on scientific literacy. Driver, Newton & Osborne (2000) and Sadler (2006) highlight the importance of students' active participation in discourse in a science classroom to develop of their scientific literacy. This means introducing in science teaching some of the processes and situations that occur in the social context, which favor the involvement of students in organizational processes of thinking, communicating ideas, adopting positions, and promote their confidence in the arguments supporting their own choices while developing respect for others (Kolstø, 2001).

Argumentation is a form of scientific discourse (Erduran & Jimenez-Aleixandre, 2012) and a powerful tool that allows students questioning, justifying, and evaluating their and others' claims (Duschl & Osborne, 2002; Erduran, Dilek & Yakmaci-Guzel, 2006). However, in science education, transmissive teaching predominates, offering few opportunities for students to engage in dialogic argumentation (Duschl & Osborne, 2002). This leads to difficulties in students' construction of arguments (Duschl & Osborne, 2002; Newton, Driver & Osborne, 1999) and highlights limitations in teachers' pedagogical abilities in the management of this type of Activities (Authors, 2016; Newton, Driver & Osborne, 1999).

On the other hand, researches show that teachers' beliefs and perceptions have a big influence in the way they teach (Porlán et al., 2010). For these reasons, it is necessary to identify their thoughts on argumentation to design specific programs of teacher training in order to promote the knowledge and awareness they need to modify their beliefs.

METHODOLOGY

72 pre-service Primary teachers at a Spanish university have participated in this study: 50 women and 22 men aged from 19 to 43 and organized in 15 work groups from 4 to 6 members. They were studying the third course of the Grade of Primary Teachers and their only exposure to science education had been in a Practicum during two weeks. Our main purpose has been to investigate their perceptions of what would be

the skills they need as a core to support argumentation in science classrooms. Specifically, we want to answer the following research questions: What skills do they think are fundamental in conducting science lessons based in argumentation? and What skills do they think students can develop when they participate in science lessons based in argumentation?

An activity was proposed to the work groups at the beginning of the subject "Science Education" module of the first semester when they still hadn't got any contact with the role of discourse and argumentation in the science classroom. This consisted in reflecting about an activity based in argumentation (Martín-Gámez & Prieto, 2015). It was adapted of PED (2013) and Its purpose was to set a context for participants to reflect about: a) why argument is important in teaching science; b) skills needed to conduct lessons based in argumentation; and c) what techniques and resources could support the argumentation. After reading it, each work group should think over and reach a consensus in their answers to the following questions: 1. Would you use such strategies in your future lessons? Why?; 2. Do you think this kind of lesson is common in the Primary school? If not, why?; 3. What skills are mainly required to use this approach?; 4. What knowledge is mainly required to use this approach?

A qualitative approach was applied. The process began with every author of this work making an individual analysis of the data, in order to determine emergent aspects (Creswell, 1998). The results of each one were compared and framed in the work of Osborne, Erduran & Simon (2004). Then, a consensus was reached to describe a set of non-excluding categories to each question.

RESULTS

The analysis shows that 11 of work groups would use this kind of activities in their science classrooms. Their reasons are collected in table 1. Only one of the groups wouldn't use argumentation activities because they consider that this kind of activities wouldn't motivate the students. The others 3 groups would use them depending on cognitive level of students.

Table 1. Categories and frequencies in affirmative answers question 1.

Categories	Frequency
To encourage questioning of ideas	9
To encourage understanding of scientific knowledge	3
To encourage ideas' justification	2
To encourage inquiry' skills	4
To allow to debates in classroom	1

Table 2. Categories and frequencies in answers question 3.

Categories	Frequency
Skill to transmit scientific knowledge	5
Skill to arouse interests	4
Skill to encourage participation	7
Skill to encourage argumentation	4
Skill to encourage reflection	6

After their Practicum period, all the work groups, except one, consider that these kind of activities are infrequent in Primary (question 2) because at science classroom predominates memory learning (7 groups), the kind of textbooks activities (6 groups) or because these activities consume a lot of time classroom (2 groups). Table 2 presents the frequencies of the work groups' answers to question 3. Eight groups mention only one teachers' skill: skill to transmit scientific knowledge or skill to encourage the participation. The other 7 groups propose a minimum of 2 or 3 skills, highlighting the one of encouraging reflection and participation. On the other hand, answers to question 4 show that a majority of groups (12) think that teachers only need scientific knowledge to use argumentation approach. The knowledge about components of a good argument and about methodological strategies to encourage argumentation are only added by 3 work groups.

CONCLUSIONS

The results show that most of these Pre-service Primary Teachers relate the argumentation approach to develop students' skills of questioning of ideas. However, they don't consider that this kind of approach will help students to develop inquiry skills and ideas justification. In addition, no one manifest that it could be a good way to promote understanding of scientific knowledge and students' learning to evaluate their own and the others ideas (Erduran, Dilek & Yakmaci-Guzel, 2006).

Furthermore, results suggest that participants think that the argumentation approach in Primary science classroom is not frequent because teachers encourage memory learning and textbooks activities. In no case they mention the specific formation that teachers should have to use this kind of approach (Newton Driver, & Osborne, 1999). It seems that Pre-service Teachers of Primary don't consider that teachers need acquire some skills to manage different methodological strategies as debate, pair work or pair discussion, among others, that support the argumentation approach. Moreover, data point out that they are not aware that this approach needs also the knowledge about what is a good argument and its components, besides scientific knowledge. These results are significant because they indicate the need in designing specific training programs to support teachers in acquiring knowledge and skills about argumentation. Then, Primary Teachers will be able to help to their future students to construct good arguments in Science Education.

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