

Developing Pedagogy for Argumentation and Teacher Agency: An Educational Design Study in the UK

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Abstract : Argumentation and the production of scientific arguments are essential components that are necessary for helping students become scientifically literate through engaging them in constructing and critiquing ideas. Incorporating argumentation into science classrooms is challenging and can be a long-term process for both students and teachers. Students have difficulty in engaging tasks that require them to craft arguments, evaluate them to seek weaknesses, and revise them. Teachers also struggle with facilitating argumentation when they have underdeveloped science practices, underdeveloped pedagogical knowledge for argumentation science teaching, or underdeveloped teaching practice with argumentation (or a combination of all three). Thus, there is a need to support teachers in developing pedagogy for science teaching as argumentation, planning and implementing teaching practice for facilitating argumentation and also in becoming more agentic in this regards. Looking specifically at the experience of agency within education, it is arguable that agency is necessary for teachers' renegotiation of professional purposes and practices in the light of changing educational practices. This study investigated how science teachers develop pedagogy for argumentation both individually and with their colleagues and also how teachers become more agentic (or not) through the active engagement of their contexts-for-action that refer to this as an ecological understanding of agency in order to positively influence or change their practice and their students' engagement with argumentation over two academic years. Through educational design study, this study conducted with three secondary science teachers (key stage 3-year 7 students aged 11-12) in the UK to find out if similar or different patterns of developing pedagogy for argumentation and of becoming more agentic emerge as they engage in planning and implementing a cycle of activities during the practice of teaching science with argumentation. Data from video and audio-recording of classroom practice and open-ended interviews with the science teachers were analysed using content analysis. The findings indicated that all the science teachers perceived strong agency in their opportunities to develop and apply pedagogical practices within the classroom. The teachers were pro-actively shaping their practices and classroom contexts in ways that were over and above the amendments to their pedagogy. They demonstrated some outcomes in developing pedagogy for argumentation and becoming more agentic in their teaching in this regards as a result of the collaboration with their colleagues and researcher; some appeared more agentic than others. The role of the collaboration between their colleagues was seen crucial for the teachers' practice in the schools: close collaboration and support from other teachers in planning and implementing new educational innovations were seen as crucial for the development of pedagogy and becoming more agentic in practice. They needed to understand the importance of scientific argumentation but also understand how it can be planned and integrated into classroom practice. They also perceived constraint emerged from their lack of competence and knowledge in posing appropriate questions to help the students engage in argumentation, providing support for the students' construction of oral and written arguments.

Keywords : argumentation, teacher professional development, teacher agency, students' construction of argument

Conference Title : ICCIPI 2018 : International Conference on Curriculum Innovation, Planning and Implementation

Conference Location : London, United Kingdom

Conference Dates : September 27-28, 2018