Operationalising Agency for Classroom Research

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The research is focused on student agency in science and employs discourse analysis in social psychology to operationalise agency as agentic positioning in science classroom conversations about or whilst doing science. Videotapes of a complete unit of work have been analysed with an emergent focus on the variability in agentic positioning of three high achieving female students. The presentation will focus on methodological issues for researching student agency, critically reviewing previous studies in science on student agency and illustrating the way agency was operationalised in my research.

Introduction

Student agency is an important contemporary focus for research in science education (Barton, 2005; Barton & Tan, 2010; Roth, 2007) and for school education in general (Kalantzis & Cope, 2008). The study sought to contribute to an understanding of how "the balance of agency" (Kalantzis & Cope, 2008) can be addressed in formal educational settings.

Previous studies of student agency in science have shown that students "express their agency" when given the opportunity to plan science lessons (Basu, 2008); evaluate classroom practices (Siry & Lang, 2010); co-construct an emergent curriculum with teachers (Goulart & Roth, 2010); share decision-making about investigations within their local community (Barton & Tan, 2010); and co-author classroom dialogue by bringing in their out-of-school discourses (Sharma, 2007). Jennings and Mills (2009) also found that student agency was a feature of a whole-school "discourse of inquiry". Agency has been defined in science education research in terms of a person's intentions to bring about change.

This study builds upon Davies' (1990) call for the operationalisation of agency as a discursive practice. The pertinent questions according to Davies are not related to whether the students have or "express" agency conceived of in terms of individual intentions but are related to whether students are given "access to discursive practices through which they can take themselves up as agentic beings" (p. 358). The focus of this paper is the methodology used to investigate participating students' positioning as agentic in science classroom discourse.

Background and Methodology

Studies of student agency in science education have previously adopted ethnographic methodologies, using interviews and observations of particular students both in an out of their science classrooms in order to: a) determine the student's goals for the future, b) observe the student's actions that aligned with the student's goals and, c) determine the state of affairs both before and after student's actions in order to detect change related to the achievement of the student's goals. Based upon the ethnographic evidence, researchers have constructed students in research accounts as responsible for their actions and for bringing about changes.

Rather than assigning responsibility to students as described above, this study, in recognizing the constitutive force of language (Harré, 1992b; Potter, 2001), sought to investigate science classroom discourse and identify moments in which students indexed responsibility to themselves. Of interest in the study was whether or not actions that the students indexed to themselves as a responsible agent were taken up as legitimate in the classroom discourse. Therefore the response of others was taken into account in the discursive analysis of meaning making as the realization of classroom storylines and positionings.

The research was conducted as an instrumental case (Stake, 2005) and the main source of data was video recordings of a science classroom in action using multiple cameras and audio tracks with support from the International Centre for Classroom Research in the Graduate School of Education at the University of Melbourne. A year-seven science class at a large, multi-ethnic, suburban, government secondary school in Melbourne, taught by an experienced and well-regarded science teacher, was chosen for the study. The science lessons were filmed for the duration of an entire unit of work on 'The States of Matter'. The research took place in the last term of the year.

Focus students for the study were three female students, who had been very successful in science assessment tasks throughout the year, and who habitually worked together during small group tasks. The focus students wore microphones on lanyards during the lessons and participated in video-stimulated, post-lesson interviews on a rotating basis. These interviews, the researcher's observational notes, copies of lesson planning documentation and work produced by all students in the class provided supplementary information for clarifying meaning in the classroom discourse.

Data Generation and Analysis

The audio tracks from all videos were transcribed. Conversations about science or whilst doing science in which the focus students participated were selected for the study. Phonological transcripts of these conversations were generated as data for the study.

A coding system, drawing upon the work of Muhlhaüsler and Harré (1990), was developed by the researcher for the purpose of identifying speech-action in which the focus students indexed responsibility to themselves. The coding system was based upon indexical features of our language that speakers can use to index their responsibility such as pronoun use, modality and tense, and together these grammatical features have been called 'the grammar of agency'.

The meaning of the students' language use was analysed in the context of the conversational episode in which the students used the grammar of agency. Meaning was analysed using discourse analysis in social psychology (Harré & Langenhove, 1999a; Wood & Kroger, 2000), and in terms of the storylines and positionings that were realized jointly by the participants in the conversation. Nine of these conversational episodes were used to communicate the findings of the study because they exemplified variability in the way the girls indexed responsibility to themselves and were representative of the way in which the girls' actions were taken up by others in the classroom discourse.

Findings and Implications

The students' actions could not be accounted for by recourse to individual intentions. Rather, the actions in which the students indexed responsibility to themselves emerged from the situations in which they were participating, either when they were positioned by others as responsible (for example to express their personal opinion) or when they repositioned themselves by publishing innovative thoughts related to something in their environment.

The student's actions that were indexed to themselves as responsible were only taken up as legitimate when they aligned with local discursive practices negotiated within the girls' small group. These discursive practices can be summarized as dominant storylines that were realized in the girls' conversations. These storylines were related to their compliance with the teacher's instructions, expedient completion of tasks and finding out the right answers. The girls took responsibility as members of their small group in these dominant storylines. Due to the dominance of these storylines, other possible storylines related to student-initiated inquiry, student evaluation of practical methods, including the degree of accuracy used in measurement, and argumentation were not taken up. As a consequence, it was found that the students took responsibility as members of a science learning community, as differentiated from a scientific community.

An implication of the study is that students negotiate meaning in science classrooms as members of student collectives and that student learning and development as responsible agents in science should be thought of as process of changing students' collective practices towards the development of science learning communities that value students' innovative ideas, student-initiated inquiry and argumentation.

Conclusion

The study contributes to the development of a "workable" definition of agency (Davies, 1990) and highlights science education as a forum in which students "naturally" (Garrison, 1996, after Dewey) index responsibility to themselves in the process of selectively attending to material phenomena in science activities.

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