Review of Discourse Analysis in Science Classrooms

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Abstract. The study of discourse in Physics Education has been growing for the last 40 years. One main interest in this field lies is the possibility of describing the interaction in real classroom environments. We present a review on the work published in journals of this field. The purpose is to describe the present state of the art, as well as emerging lines of research. Approximately 120 research reports were analyzed and classified into categories arising from an iteration process in which categories an criteria were revised and refined. Results offer an overview of the main consensus and open issues found in the literature.

1 Introduction

The PER community has become increasingly interested in discourse analysis as a means of understanding learning in classrooms. Discourse Analysis has been strongly influenced by a vygotskian perspective, according to which learning occurs primarily at a social context mediated by cultural communication tools, and is late internalized by the individual.

Following this approach, seminal research was carried out by authors such as Mehan [1], who describes interaction patterns in classrooms, Lemke [2], who posits that learning science is an enculturation process through the mastering of scientific language and Mortimer [3], who diferentiantes the dialogic/authoritative dimension from the (non)interaction one. Discourse analysis became an even more essential research tool when numerous reform-based curriculum proposals put students and their productions in a more central role within classrooms across different countries.

Here, we attempt a review on the research on discourse analysis, so that we can have a more clear idea of the work researchers have accomplished and the one the community is still struggling with. We hope this review will be potentially useful to orient future research in the field.

2 Method

A first temporal threshold was established advancing on a previous work by Howe and others [4] on 40 years of research up to 2011. Our work takes up certain journals from then on to 2017. Our database consisted of the following journals: Int'l Journ of Science Education; Journ of Research in Science Teaching, Journ of the Learning Sciences, Cognition and Instruction, Revista de Ens. de la Física, Science Education, Enseñanza de las Ciencias, Phys Rev PER, Eureka, Investigações em Ensino de Ciências, Revista Electrónica de Enseñanza de las Ciencias. We decided to revise these titles because we considered them representative of a reference list used by the international community, including English and Spanish-speaking countries.

3 Results and conclusion

Two great sets of research reports were first identified. The first one includes work that focuses solely on discourse dynamics as the object of analysis. In the second one, discourse is studied as a means to understand learning. We also diferentiated studies who study only students' interactions from those that study the interactions of students and teacher(s). Four categories were thus constructed, through an iterative process. Categories were proposed, discussed among researchers, criteria were discussed and reconsidered, until consensus was reached. Categories are as follows:

A: Research on the interaction between students. Analysis typically focuses on social dynamics such as authority in students' opinions, and self-regulation.

B: Interactions between students and teacher. In addition to the issues addressed in studies of group A, they attend to teachers' discourse strategies and the relationship to particular pedagogical purposes.

C: Interactions among peers and content. These studies focus on the interactions between peers and their relation to content-learning. There is consensus in stating that improvement of argumentation skills is correlated to other skills such as mastery of science talk, and articulation of different modes of representation.

D: Studies focusing on interactions between students, teacher and content. Discourse analysis is used to address the way teachers promote learning among students.

There has been a wide variety of analysis and approaches in the last few years of discourse research. Preliminary results allow the identification of consensus as well as unexplored venues for future research. Categories C and D, which include analysis of interactions and learning around specific content, have particularities within them. A great deal of research has been carried out to address the nuances and role of argumentation in science-learning environments, but a significantly less amount of work has attended the learning of concepts. This question brings about the need to address the role of discourse in concept-learning within participative environments.

References

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