



Argument relevance and structure. Assessing and developing students' uses of evidence



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ABSTRACT

The purpose of this paper is to show whether the two crucial dimensions used for assessing the quality of argumentation, argument-as-a-product (argument structure) and argument-as-a-process (relevance), are interrelated, and how they can be used to assess the effect of argumentative mode on students' arguments. To this purpose, a twofold coding scheme will be developed, aimed at capturing: a) the argumentative function of evidence use and b) the dialogical relevance of evidence use. A study will be described in which students' use of evidence is elicited in two distinct argumentative modes (dialogical vs. non-dialogical). According to the results, in the dialogical mode students tended to use evidence in a more sophisticated way from both argument evaluation perspectives.

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1. Introduction

The role of argumentation in students' interactions and learning is increasingly becoming a central component of education (Erduran, Ozdem, & Park, 2015; Muller-Mirza & Perret-Clermont, 2009). One of the most important goals of education is to provide people with the capacities to assess the available information, select the most relevant and adequate evidence, and make judgments and decisions based thereon. These aims constitute the core of argumentation theory, a field of studies that addresses the analysis of natural arguments in discourse (Walton, 2006). The theoretical instruments developed in the cross-disciplinary field of argumentation theory can be of fundamental importance for enhancing the students' critical thinking skills and improving classroom interactions (Carey, 2000; Muller-Mirza & Perret-Clermont, 2009; Osborne, Erduran, & Simon, 2004).

This paper focuses on a specific dimension of argumentation that is essentially related to the understanding and development of students' knowledge, namely the use of evidence. Epistemological understanding is essentially related to argument (Kuhn, Cheney, & Weinstock, 2000; Kuhn & Udell, 2007). The use of data for argumentative purposes (i.e. to support, assess, question, or refute a claim) reveals and affects student's epistemological background (Sandoval & Millwood, 2005). The way students use data and evidence shows how they have interpreted and evaluated such pieces of information, and how the latter have become or become part of their background knowledge. The interpretation, assessment, and justification of a piece of evidence, or rather the critical stand towards it, is mirrored and encouraged by how an individual coordinates it with claims and other concurring or conflicting evidence (Kuhn, 1993, 2002). The dialectical assessment of a piece of information, shown by its use in constructing arguments or questioning or attacking arguments and claims, is related to its understanding (Nussbaum & Edwards, 2011). Failure to connect evidence to a claim suggests failure to interpret

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the former, distinguish it from a point of view, and address it critically (Jimenez-Alexandre, Rodriguez, & Duschl, 2000; McNeill & Krajcik, 2008; McNeill, Lizotte, Krajcik, & Marx, 2006; Sandoval & Millwood, 2005). Improper use of evidence risks leaving students with beliefs that they are not able to justify and assess (Osborne, Erduran, Simon, & Monk, 2001).

The development of more sophisticated uses of evidence is essentially connected with the strategies for developing argumentation skills (Kuhn, 1993, 2002). Argumentative, collaborative dialogues have been shown to be an extremely effective teaching strategy (Alexopoulou & Driver, 1996; Baker, 1999; Driver, Newton, & Osborne, 2000; Kuhn, 1992; Light & Glachan, 1985; Murray, 1982; Nussbaum, 2008a, 2008b) both for improving students' critical skills (Koballa, 1992; Osborne, 2010) and addressing background knowledge (Hewson, 1992; Limón, 2001). In dialogues, students are confronted with alternative views, and thus encouraged to take a critical stand towards the evidence they are presented with, in order to analyze the reasons to prefer a point of view or a piece of evidence over another (Osborne et al., 2001). On this argumentative perspective, education should construct students' knowledge through argumentative interactions (Baker, 1999). By addressing opposite views, countering claims, and rebutting conflicting evidence, students have been shown to acquire not only the knowledge of scientific concepts, but the grounds on which such concepts are based (McNeill & Krajcik, 2008; Osborne et al., 2001; Sandoval & Millwood, 2005).

The development of argumentation skills, and more precisely of the argumentative uses of evidence, depends on the assessment of an argument, namely determining what counts as a better or more sophisticated argument or component thereof. However, argument can mean both the product, namely the quasi-logical support (justification) of a claim (Erduran, Simon, & Osborne, 2004; Means & Voss, 1996; Zohar & Nemet, 2002), and the process, or rather the (dialogical or individual) argumentative debate. In education, most of the empirical research has focused on the product (Kuhn & Udell, 2007), neglecting the concept of goal of an argument, namely for what discursive purpose it has been advanced (Kuhn, Shaw, & Felton, 1997; Kuhn & Udell, 2003, 2007). However, arguments cannot be considered solely as quasi-logical connections between premises and conclusion (Tindale, 1999). They are reasons provided to support or challenge a viewpoint that is subject to doubt, using premises that the interlocutor is presumed to accept (Walton, 2006). The structural completeness, logical soundness, and strength of an argument is only *one* evaluative dimension. The other dimension is about the purpose of an argument, namely how the speaker's arguments are related to the interlocutor's ones or address the topic of the discussion, and how an argument can contribute to moving forward the dialogue (Walton, 2004a, 2008). In argumentation theory, this fundamental aspect of argument evaluation is analyzed under the label of "relevance" (Dascal, 1979; Giora, 1997; Grice, 1975; Tindale, 1999; Walton & Macagno, 2007; Walton, 2004b).

The purpose of this paper is to analyze the relationship between argument product and process, namely between its quasi-logical structure and its relevance (or discursive/pragmatic goal), in two distinct argumentative modes (dialogical vs. non-dialogical). The focus will be on the argumentative quality of evidence use, namely on how students use evidence for argumentative purposes. To this purpose, a twofold coding scheme, aimed at capturing both aspects of argument quality, will be used to assess the quality of students' evidence use in both modes. The results of the two distinct argument-quality coding criteria in the two argumentative conditions will be compared.

2. Literature review

In order to assess and develop the best strategies for improving students' argumentation skills, it is of fundamental importance to establish what counts as a more sophisticated argument (more specifically in this case, a more sophisticated use of evidence). Evidence is data – consisting in measurements, the authority of experts or qualified sources, or experiments – that can be used to support a point of view (Aikenhead, 2005; McNeill, 2010). To be used as the grounds for a claim, evidence needs to be interpreted so that the relevant argumentative and cause-effect relations are brought to light. Epistemological understanding can be at the same time be mirrored by and developed through students' arguments (Kuhn et al., 2000; Kuhn & Udell, 2007).

The evaluation of the uses of evidence is essentially connected with the assessment of argument quality. In order to establish what counts as a better use of a component of an argument, it is necessary to rely on a theory of argument quality. In the education literature, evidence has been assessed mostly based on its structural function, namely its "logical" function of supporting or justifying a claim. Maloney and Simon pointed out how the development of children's argumentation depends on their ability to evaluate evidence in terms of its adequacy, its relevance, and its source (Maloney & Simon, 2006; p. 1823). These three dimensions concern the force of evidence (source) and its relationship with the claim (relevance and adequacy), which is ultimately analyzed the Toulmin's Argument Pattern (henceforth TAP) (Erduran et al., 2004; Toulmin, 1958). Similarly, in (Sandoval & Millwood, 2005), the quality of evidence use was assessed according to three correlated criteria: 1) sufficiency; 2) rhetorical reference; and 3) conceptual quality (see also McNeill, 2010). All the three criteria assess the same aspect of an argument, namely the connection between justification and claim. The first criterion, addressing the structure of arguments, is used to judge whether students cited enough of the relevant data to justify their claims. Rhetorical reference concerns how evidence is referred to in students' explanations. The last criterion, conceptual quality, is used to assess whether or not evidence reasonably supports a claim (Sandoval & Millwood, 2005). Also in this case, the structural dimension is the one that is taken into account for determining the quality of evidence use. Other approaches assess the quality of the use of a premise or evidence referring to the notion of "relevance to the claim" (Schwarz, Yair, Julia, & Merav, 2003; Zembal-Saul, Munford, Crawford, Friedrichsen, & Land, 2002). However, this notion is often not defined and is measured only through the TAP model.

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