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Student Thought and Classroom Language: Examining the Mechanisms of Change in Dialogic Teaching

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Dialogue, as a communication form characterized by its commitment to inclusiveness and rationality, has long been advocated by educators as a mechanism for helping students become better thinkers. Unfortunately, numerous claims about the educational potential of participating in dialogue have not resulted in substantial changes in classroom practices. Studies have consistently shown that in today's schools the dominant discourse remains largely monologic. In this article, we present a testable theory of change that suggests how sociocultural processes in a dialogic classroom influence students' development. We identify and discuss three learning outcomes of dialogic teaching, including epistemological understanding, argument skills, and disciplinary knowledge. We then critically review empirical research related to the proposed theory, highlighting unsolved questions, inconsistencies, and directions for future studies. Finally, we focus on the implications of the proposed integrated theory and reviewed research for teachers and their language use in a classroom.

For decades, educators have been captivated by the role classroom language plays in shaping students' thinking (Cazden, 2001; Halliday, 1993; Vygotsky, 1981; Wells, 1999). Although language is increasingly seen as the primary mechanism for learning, not all communication patterns are considered to be equally effective, especially for promoting student behaviors at the higher levels of cognitive complexity. Theorists and researchers have suggested that the true pedagogical value of a verbal exchange between teachers and students lies in its dialogic organization (R. J. Alexander, 2005; Bakhtin, 1984; Freire, 1993; Mead, 1962; Nystrand, Wu, Gamoran, Zeiser, & Long, 2003). When explaining the meaning of genuine dialogue, Bakhtin (1984) distinguished it from "monologism, which pretends to possess a ready-made truth" (p. 110). In monologic teaching, "someone who knows and possesses the truth instructs someone who is ignorant of it and in error" (Bakhtin, 1984, p. 81). In contrast, in a dialogic classroom "truth . . . is born between people collectively searching for truth, in the process of their dialogic interaction" (Bakhtin, 1984, p. 110). In a similar way, though in more political terms, Freire (1993) diagnosed monologic education as "suffering from narration sickness," typified by the teacher whose "task is to 'fill' the students with the contents of his narration" (p. 52). He famously referred to this kind of pedagogy as "the 'banking' concept of education, in which the scope of action allowed to the students extends only as far as receiving, filing, and storing the deposits" (p. 53). Freire proposed an alternative model of "problem-posing education [that] regards dialogue as indispensable to the act of cognition" (p. 64).

Broadly defined, *dialogic teaching* is a pedagogical approach that involves students in the collaborative construction of meaning and is characterized by shared control over the key aspects of classroom discourse (R. J. Alexander, 2008; Burbules, 1993; Freire, 1993; Webb et al., 2007). Many educational theorists have advocated for a more widespread use of dialogic teaching (Burbules, 1993; Gregory, 2004; Lipman, 1988; Paul, 1986; Wells, 2000). There is also emerging empirical evidence to indicate its potential to help students develop higher order thinking and deeper understanding of subject-matter knowledge (Murphy, Soter, Wilkinson, Hennessey, & Alexander, 2009; Reznitskaya et al., 2009; Schwarz, Neuman, & Biezuner, 2000; Wegerif, Mercer, & Dawes, 1999). Nevertheless, the predominant mode of classroom communication today remains monologic rather than dialogic (R. J. Alexander, 2005; Mehan, 1998; Nystrand et al.,

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2003). In a recent observational study of 64 middle school and high school English classrooms in five states (Applebee, Langer, Nystrand, & Gamoran, 2003), researchers found that the average amount of time spent on dialogic discussions was only 1.7 min per 60-min class. Instead of engaging students in a dialogue, many teachers continue to control both the content and the form of classroom communication by choosing questions and topics, nominating student speakers, and correcting their answers. In many contemporary classrooms, "teachers rather than learners do most of the talking" (R. J. Alexander, 2005, p. 2). When students speak, they are often required "to report on someone else's thinking, rather than to think for themselves." They are then "judged on their accuracy or compliance in doing so. . . . This script is remarkably resistant to efforts to transform it" (R. J. Alexander, 2005, p. 2).

Thus, there exists a disparity between the endorsed educational ideal of dialogic teaching and the reality of typical classroom practice. In the effort to support advocated changes in classroom communication, we present a comprehensive theoretical model that clarifies the relationships between dialogue, teaching, and learning. In formulating our theory, we have drawn upon diverse academic fields, including the literatures in philosophy of education, cognitive science, educational psychology, epistemology, and the study of argumentation (e.g., Burbules, 1993; Flavell, 1985; Freire, 1993; Keefer, Zeitz, & Resnick, 2000; Kuhn, 1991; Nystrand et al., 2003; Vygotsky, 1968; Walton, 1998). By integrating schema-theoretic and sociocultural perspectives on learning, our model explains how students develop their epistemological understanding, argument skills, and disciplinary knowledge through engaging in a dialogic interaction with others. Through articulating the mechanisms of change in a dialogic classroom and connecting them to specific new competencies to be acquired by students, we hope to stimulate more theory-driven studies of dialogic teaching that can inform instructional choices of practitioners. We also critically review existing empirical evidence related to the proposed theoretical principles, pointing out unsolved questions and problems that require more attention from researchers. Finally, we discuss suggestions for supporting teachers' use of dialogic practices in their classrooms.

INQUIRY DIALOGUE

Definition and Assumptions

Following Burbules (1993), we define dialogue as "a continuous, developmental, communicative interchange through which [participants] stand to gain a fuller appreciation of the world, [themselves], and one another" (p. 8). Different types of dialogue can be used to achieve different goals (Burbules, 1993; Keefer et al., 2000; Walton, 1998), and this article focuses on teaching through *inquiry dialogue*. Inquiry dialogue is initiated by an open question, and its main goal is to collectively formulate reasonable judgments, adding to a group's existing body of knowledge and mutual understanding (Walton & Macagno, 2007). Although the term *persuasion* has also been used to denote similar uses of reasoned discourse (e.g., P. A. Alexander, Fives, Buehl, & Mulhern, 2002), the word *inquiry* may be more appropriate based on the distinction proposed by Walton (1992). According to Walton, persuasion dialogue is focused on convincing someone to accept a given position, whereas inquiry dialogue is a collaborative attempt to reach a sound conclusion. This difference in goals is important because it may affect normative protocols (i.e., rules of what is considered appropriate in the dialogue), the standards used to evaluate the strength of proposed arguments, and the pedagogical approaches to teaching argumentation (Nussbaum, 2011; Walton, 1992).

To effectively use inquiry dialogue in a classroom, teachers, and eventually their students, need to develop views of knowledge and knowing that are congruent with this pedagogical approach (Kuhn & Crowell, 2011; Windschitl, 2002). Specifically, dialogic teaching and learning requires an underlying commitment to rational thinking as a mechanism for formulating better judgments. Researchers have proposed a variety of models to account for people's conceptions of knowledge and knowing, or personal epistemology (Hofer, 2001; Schraw, 2001). Generally, people progress from a simple view of knowledge as static and possessed by authorities to a more advanced understanding of knowledge as socially constructed through the use of reasoning (Hofer, 2001). In this article, we rely on a useful classification of individual theories of knowledge proposed by Kuhn (1991), who described three hierarchically ordered stages of epistemological development: absolutist, multiplist, and evaluativist.

Absolutists view knowledge as fixed and existing independently of human cognition. Experts know the truth, which is certain and proven by hard facts. Dewey (1988) dubbed this view "the spectator theory of knowledge" and critiqued it both for its underlying theory of reality as unchanging and for its misconstrual of knowing as a kind of detached seeing or beholding, rather than an active interaction with the world (p. 163). At the next stage, multiplists see knowledge as entirely subjective, devaluing the use of shared rules of knowledge justification and the legitimacy of expertise. For multiplists, experts are as fallible as laypeople, and there are no established methods that can help us to judge the soundness of different arguments or to reconcile opposing opinions. In Kuhn's (1992) research, participants at multiplist stage maintained that "everyone has his own point of view" and that "they're opinions, and you can't disprove them" (p. 184). Representing the most advanced stage, evaluativists accept that there is a subjective dimension to knowledge. However, they also recognize that certain methods of inquiry guard against certain kinds of biases and errors; that it is possible to engage in a rational evaluation of different viewpoints; and that, as a result, we ought to consider some judgments to be more defensible than others. It is important to note that there are critics of rationality, who do not accept the privileging of

the evaluativist epistemology. However, arguing for our commitment to the evaluativist position is beyond the scope of this article. For an insightful discussion of this topic, please refer to Terry Eagleton's (2003) chapter "Truth, Virtue and Objectivity."

Multiplist and absolutist epistemologies are incompatible with dialogic teaching. In the words of Bakhtin (1984), "both relativism and dogmatism equally exclude all argumentation, all authentic dialogue, by making it either unnecessary . . . or impossible (p. 69). Despite their differences, both multiplists and absolutists rely on fundamentally monologic assumptions about knowledge: They either discount a possibility of shared understanding or insist on an absolute truth (Sidorkin, 1999). Multiplists would fail to appreciate the value of inquiry dialogue in a classroom because they see knowledge as entirely relative and idiosyncratic. Likewise, absolutists would see no need for engaging in collective knowledge construction and critique because they believe that only authority figures have legitimate knowledge. Thus, it is evaluativist epistemology that provides for a suitable context for using inquiry dialogue in teaching. In an evaluativist classroom, teachers and, gradually, their students come to see knowledge as "the product of a continuing process of examination, comparison, evaluation, and judgment of different, sometimes competing, explanations and perspectives" (Kuhn, 1991, p. 202).

Notably, evaluativist views depart significantly from the core assumptions about knowledge and learning that have shaped Western schooling (Windschitl, 2002). Instead, traditional instruction reflects behaviorist and absolutist conceptions. Knowledge is transmitted to learners by authority figures through the unambiguous use of language. Learning involves passively and unselectively receiving and reproducing knowledge known by experts in its original, objective form. According to Freire (1993), this tradition assumes that "knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing. Projecting an absolute ignorance onto others . . . negates education and knowledge as a process of inquiry" (p. 53). These assumptions are manifested in contemporary schools through a familiar *recitation sequence*, which has been well documented and criticized as the prevalent mode of classroom communication (e.g., R. J. Alexander, 2008; Alvermann, O'Brien, & Dillon, 1990; Henning & Lockhart, 2003; Mehan, 1998; Nystrand et al., 2003; Onosko, 1990). During recitation, teachers initiate and control all communication. Students speak only to respond to "test" questions, recalling basic, often disconnected bits of information. Student responses are then evaluated by the teacher, whose authority cannot be questioned and who serves as the only source of right answers.

In contrast, dialogic teaching embodies sociocultural and constructivist theories of learning and reflects evaluativist epistemology (e.g., Anderson, 1977; Mead, 1962; Piaget & Inhelder, 1969; Vygotsky, 1962; Wertsch & Bivens, 1992). According to these perspectives, students are viewed as active meaning makers who learn through constructing and negotiating new understandings in interaction-rich communities of practice. In addition to the development of subject-matter knowledge, the goals of schooling include the appropriation of intellectual dispositions that underlie the construction of disciplinary expertise.

Social and Interactional Practices in a Dialogic Classroom

What should be happening in a dialogic classroom? Although various programs and practices have evolved, some of which describe dialogic teaching somewhat differently, there are key distinguishing characteristics that consistently appear across multiple accounts (e.g., Burbules, 1993; Lipman, 1988; Mercer & Littleton, 2007; Nystrand et al., 2003; Paul, 1986; Scott, Mortimer, & Aguiar, 2006; Wells, 2000; Wilkinson, Reninger, & Soter, 2010). First, in dialogic teaching power relations are flexible, and responsibilities for the form and content of talk are shared among group members. Classrooms are transformed into *learning communities*, where participants meet on terms of equality and take on key roles in navigating class communication: They ask questions, participate in turn management, and evaluate one another's answers (Sharp & Splitter, 1995). "The . . . teacher loses the position of external boss or dictator, but takes on that of leader of group activities" (Dewey, 1967, p. 59). As teachers in a dialogic discussion strategically support disciplined inquiry into contestable questions, they "treat students as potential sources of knowledge and opinion, and in so doing complicate expert-novice hierarchies" (Nystrand et al., 2003, p. 140). It is important to note that such a view of teacher–student relations does not dismiss the authority of a teacher as a more knowledgeable partner in a discussion. Burbules (1993) argued that acknowledging authority based on one's expertise or experience does not necessarily threaten the egalitarian nature of interactions and, instead, helps to enhance the intellectual rigor of inquiry. He explained,

> authority in the context of dialogical relation can have legitimacy, based neither on institutionalized roles and privileges nor on unexamined assumptions about expertise. Nor need it be seen as a static possession of one partner. . . . Rather, authority should be viewed as growing out of on-going communicative interchange that acknowledges differences in knowledge, experience, or ability without reifying them. (p. 34)

(1) One aspect of this communicative interchange is that students come to understand their teacher's mastery of a subject as resulting from her own participation in another, professional community (i.e., of mathematicians, historians, or biologists). This understanding grounds but also qualifies the teacher's content expertise. Students see her, on one hand, as a professional who can guide, inform, and at times correct their own inquiries but also, on the other hand, as someone

whose own expertise is limited, and who is in a position to recognize innovative methods and answers the students generate (Gregory, 2002).

Second, dialogic teaching centers around questions that are "fundamentally open or divergent . . . in terms of allowing a broader degree of uncertainty in what would constitute an adequate answer" (Burbules, 1993, p. 97; see also Lefstein, 2010; Splitter & Sharp, 1996). The purpose of open-ended questions is neither to test students nor to simply lead them to a narrow range of answers deemed acceptable by the teacher. Rather, these questions invite students to take part in a disciplinary inquiry—a higher pedagogical goal. They "*problematize*, or transform commonly accepted facts or answers into problems to be explored, thereby opening knowledge to thinking" (Lefstein, 2010, p. 176). It is important to note that open-ended questions can inspire meaningful inquiry, even when students are learning the subjects with "already known" answers, such as physics or math. The widely accepted facts and principles in various disciplines have evolved through ongoing dialogue in academic communities, whose members challenged, supported, and complimented one another's work (Longino, 1990). Similarly, a classroom community "should treat all questions asked and answers offered as grist for further inquiry, even when someone claims, perhaps justifiably, to 'know the answer'" (Splitter & Sharp, 1996, p. 300). In this way, students learn to appreciate the public, contestable, and evolving nature of disciplinary knowledge, or, in other words, acquire more sophisticated epistemologies. As argued by Dewey (1933), teaching subjects to students by presenting a logically ordered sequence of established facts creates a false impression of how inquiry in any field actually happens. Moreover, it robs students of the chance to experience the kind of thinking that underlies disciplinary expertise. This is why the emphasis in a dialogic classroom is on "the activity of knowing" (Wells, 1999). Students are not expected to "reinvent the wheel," but to experience, resolve, and enjoy at least some of the intellectual challenges of the original inventors. As students publically share their thinking about a contestable question, they

> are bound to present a diversity of views on almost any topic they are invited to investigate. This diversity must be reflected in the inquiry process if those involved are expected to own, and value, whatever conclusions are reached. . . . The members of a genuine community of inquiry will rightly be swayed by what is said, and by reasons offered for and against, but they will not be swayed by the fact that it is the teacher who said it. (Splitter & Sharp, 1996, p. 300)

Thus, the use of open-ended questions supports the egalitarian nature of interactions and helps to engage students in higher order thinking (Burbules, 1993; Splitter & Sharp, 1996). It facilitates the kind of genuine inquiry that allows students to develop more reasonable and personally meaningful judgments, as they base these judgments on the relative strengths of arguments proposed by their peers and the teacher during group discussions.

Third, dialogic inquiry is inherently metacognitive, in that it requires the group to engage in ongoing "cognitive activity that takes as its object" both the products and the processes of interaction (Flavell, 1985, p. 104). Metacognition includes the awareness of the content of one's and others' thinking and the ability to monitor and regulate thought processes in ways that support and improve performance (Kuhn & Dean, 2004). For example, a student in a dialogic discussion may ask his peer to clarify a vague remark. This request implies that the student has an insight into his own level of understanding (i.e., "I don't get this") and a "compensatory strategy" that serves to remedy the situation, improving the learning experience of the individual and the group.

The teacher in a dialogic classroom has an important role of modeling and encouraging metacognition by helping students pay attention to the quality of their reasoning (Gregory, 2007; Waggoner, Chinn, Yi, & Anderson, 1995). The use of metacognitive strategies transforms a directionless conversation into an inquiry, during which the participants' thinking moves toward reasonable judgments. In a dialogic classroom, teachers are "substantively weak" but "procedurally strong" (Kennedy, 2004; Splitter & Sharp, 1996). They purposefully assume the position of "scholarly ignorance," refraining from posturing as having all the right answers or from directly supplying answers to students (Splitter & Sharp, 1996). This means that instead of correcting erroneous conclusions proposed by the students, teachers will engage their students in the reflection on the inquiry process used to arrive at these conclusions.

The emphases in dialogic classrooms on open-ended versus known-information questions and on processes versus products of thinking do not necessarily imply a dichotomy between teaching students *how* to think versus *what* to think (Harpaz, 2007). Through collectively engaging in inquiry dialogue, students eventually formulate conclusions that are "*most reasonable by account of all available arguments and evidence*" (Gregory, 2006). These conclusions represent the products of dialogic teaching. During inquiry dialogue, student misconceptions, gaps in knowledge, and flaws in reasoning become visible to the group and are "put to the test of *public accountability*" (Gregory, 2006). Sohmer, Michaels, O'Connor, and Resnick (2009) discussed three facets of public accountability, including "accountability to learning community, knowledge, and rigorous thinking" (p. 106). Accountability to knowledge, for example, "demands knowledge that is accurate and relevant to the issue under discussion" (p. 106). Thus, the dialogic process guards against errors in substantive conclusions, as the group continually self-corrects by using the methods of inquiry suitable for a given discipline (Gregory, 2006). P. A. Alexander et al. (2002) described a symbiotic relationship between the processes and products of inquiry, suggesting that "critical thinking and reasoning are . . . essential processes that allow

for the internalization of domain-specific knowledge and exploration of related beliefs. Reciprocally, the activation of domain knowledge and beliefs fuels students' critical thinking and reasoning" (p. 796).

THEORETICAL MODEL OF DIALOGIC TEACHING AND LEARNING

In this section, we present a theoretical model that explains how teaching and learning happen in a dialogic classroom. We now focus on the hypothesized psychological mechanisms, deferring the discussion of the empirical evidence for the proposed theories to the subsequent sections.

Learning Processes and Outcomes

When explaining general mechanisms of learning, sociocultural theorists call attention to the priority "in time and in fact" of social interaction in individual development (Luria, 1981; Wells, 1999). Learning occurs through "the mastery of devices of cultural behavior and thinking" (Vygotsky & Luria, as cited in Wertsch & Tulviste, 1992, p. 551). Students need to encounter and *use* these devices, or "cultural tools," to augment their mental capacities. Language is the "tool of tools" that not only facilitates interaction but also fundamentally transforms individual cognition (Cole & Wertsch, 1996). "When children learn language, they are not simply engaging in one type of learning among many: rather, they are learning the foundations of learning itself" (Halliday, 1993, p. 93).

As individuals engage in the "process of making meaning with others," they get to experience and, gradually, appropriate various cultural tools (Wells, 1999). Students change their mental structures, as they internalize "the resources of the culture" from a social, external, plane to an individual, internal plane (Wells, 1999). For instance, a student who says something vague in a discussion will at first only recognize that vagueness when someone else in the classroom community pushes her for clarification. Eventually the student anticipates this reaction from her peers and self-edits her ideas before communicating them to the group. What began as interpersonal interaction becomes an intrapersonal cognitive habit.

Importantly, internalized knowledge is not simply a duplicate of external social patterns (Wertsch & Bivens, 1992). According to Vygotsky (1981), "it goes without saying that internalization transforms the process itself and changes its structure and functions" (p. 163). This implies that learners will actively and selectively construct new meanings based on their existing understandings about the world. Further, as learners change their thinking, they, in turn, contribute in new ways to the construction of the group's knowledge (Wells, 1999). Wells (1999) explained this cyclical pattern of individual and group development as follows:

> In the course of further social activity, the individual externalizes the process that she has appropriated in behavior that is novel in the situation and which, as a result, may transform the way in which situation is understood by other members of the culture. (p. 43)

For example, a student who has, through observation and practice, become skilled at giving counterexamples may then offer a unique counterexample that did not or would not occur to others in the class.

Relating sociocultural theories to dialogic teaching, we suggest that participation in inquiry dialogue with others offers an external arena where students can practice using the tools of rational and collective thinking and eventually transform them into individual psychological functions through the process of internalization. Stressing the connection between public and private thinking, Mead (1962) argued that individual reasoning is a process of internal argumentation, a dialogue with a "generalized other" (p. 156). Similarly, Bakhtin (1986) wrote that "our thought itself . . . is born and shaped in interaction and struggle with other's thought, and this cannot but be reflected in the forms that verbally express our thoughts as well" (p. 92). Thus, collaborative engagement in inquiry dialogue makes thinking processes visible to group members, supporting the development of rationality in individuals.

As class participants collectively formulate, defend, and scrutinize each other's viewpoints, they begin to appropriate general intellectual dispositions and specific linguistic skills of reasoned argumentation, which they can use whenever they need to resolve complex issues. In other words, dialogic discussions offer students a kind of apprenticeship, during which the principles of disciplined inquiry, first practiced among peers (i.e., social, intermental plane), become part of one's cognitive functioning (i.e., individual intramental plane). Just like pebbles in the ocean that rub against each other and, in the process, change their original shapes, students polish their abilities to engage in rational argumentation, as they encounter new language and thought practices during their interactions with peers. This process is reciprocal: As students advance their knowledge and skills, they influence the functioning of the class, thus prompting a new cycle of individual and group transformations.

To further clarify essential learning outcomes acquired by individual students as a result of their engagement in inquiry dialogue with others, we rely on constructivist approaches, in particular, schema theory (e.g., Anderson, 1977; Rumelhart & Ortony, 1977). Schema theory proposes that knowledge can be represented as generic mental structures, or schemas. Learning involves generation and modification of these schemas, and successful transfer entails accessing and applying relevant abstract structures (Gick & Holyoak, 1987; Reed, 1993). To describe one of the key outcomes of dialogic teaching, we suggest that through consistent engagement in inquiry, dialogue students come to recognize

important commonalities in their experiences and, as a result, develop an internal abstract knowledge structure we call an *argument schema* (Reznitskaya et al., 2008). To specify the elements involved in an argument schema, we draw upon the normative models proposed by argumentation scholars (e.g., Toulmin, 1958; Walton, 1996a). In an influential book, Toulmin (1958) suggested a model of a rational argument, pioneering the effort to define nonoverlapping functions of the premises, including a data, a warrant, and a qualifier. Other theorists expanded Toulmin's model to incorporate additional elements, such as a counterargument (Walton, 1996a).

Most systems of argumentation and informal logic distinguish the form of the argument from the truth value of its premises—a distinction first noted by Aristotle (Ross, 1952). The distinction is necessary to the operation of logic, but misleading, if it is taken to imply that the truth value of premises can be arrived at independently of rational (argumentative) inquiry. The premises of literary interpretation are supported by details in the text, the premises of legal arguments are established by witness or expert testimony, the premises in historical arguments are justified by reference to historical documents and artifacts, and the premises of scientific arguments are supported through the collection and analysis of data. But in all these cases, unless undisputed or stipulated, the truth value of premises must be justified, and justification is another instance of inquiry. Indeed, it is precisely in episodes of inquiry dialogue that doubt may arise regarding premises formerly taken for granted. When the logic of an argument seems unassailable, but its conclusion appears unacceptable or counterintuitive, the only recourse is to become suspicious of the truth value of the premise. Understanding the standards of evidence used to develop the premises of an argument is thus another important element in a sophisticated argument schema.

The concept of an argument schema was further developed by Anderson et al. (2001), who proposed that argumentative knowledge can be analyzed at the level of metacognitive language structures, called *argument stratagems*. Argument stratagems are inquiry moves that help one to progress toward sound judgments. These language structures represent "tools of wide application" (Carey, 1985) and can serve a variety of functions, such as introducing a counterargument, questioning the source of information used as evidence, acknowledging uncertainty, or inviting a classmate to speak. According to Anderson et al. (2001), students in a dialogic discussion "appropriate an argument stratagem when they judge that the stratagem is a useful tool for advancing understanding or adding to the persuasive force of an argument" (p. 4). For example, during the discussion, participants may use phrases, such as, "Some people might say ..." or "Someone may disagree because ..." to suggest an opposing point of view overlooked by the group. We can label this stratagem with the general form, "Some people might say [COUNTERARGUMENT]." The capitalized, bracketed part of the stratagem will change in response to contextually different scenarios. However, the underlying function and possible consequences will remain the same (Anderson et al., 2001).

The concept of a schema has been employed previously in research on argumentation and reasoning (Bereiter & Scardamalia, 1982; Cheng & Holyoak, 1985; Walton, 1996b). For example, Walton (1996b) used the term *argumentation schemes* to analyze several types of inferences that appear in everyday argumentative discourse, including arguments from expert opinion, example, analogy, and so on. Other researchers (e.g., Cheng & Holyoak, 1985) employed the notion of *pragmatic reasoning schemas* to describe context-specific psychological mechanisms that account for typical responses to conditional reasoning tasks. Researchers in writing and reading have used the term to represent a global structure of argumentative text (e.g., Bereiter & Scardamalia, 1982). The concept of an argument schema we propose is broader than the previously outlined notions because it incorporates both the knowledge of logical principles and standards of evidence, as well as metacognitive aspects of reasoning. In addition, it emphasizes the social nature of argumentation, where individual arguments are modeled after public discourse and represent "internalized conversations" with others (Mead, 1962).

Our theory further assumes that it is possible to postulate general, "field-invariant" characteristics of an argument. Although different knowledge domains (i.e., moral, scientific, legal) have their own specialized procedures of investigation, rules of evidence, and standards of reasonableness (Toulmin, 1958), we agree with Dewey (1938) that inquiry, understood as the search for reasonable belief, has the general structure of generating hypotheses in response to well-formed questions and testing those hypotheses with evidence and arguments in order to arrive at the most reasonable conclusions. For instance, the stratagem of arguing against a proposition because it leads to an unacceptable consequence can be generalized, even though what counts as unacceptable will be domain specific, for example, morally reprehensible, contradicted by factual evidence, or in violation of a precedent. Further, even "field-dependent" rules of argumentation can be generalized across multiple contexts within a disciplinary domain. Thus, we can think of an argument schema as an aggregation of both general and field-specific reasoning structures, standards, and stratagems. Because this knowledge of argumentation is abstract, learners should be able to show positive transfer to new situations—both within and among domains. Just like entering a new restaurant activates "a restaurant schema" (Schank & Abelson, 1977) abstracted from multiple prior experiences with ordering, eating, and paying for food, a situation that calls for forming a judgment should trigger a set of cognitive and metacognitive practices that constitute an argument schema.

Separate common elements of an argument schema and their relationships are supported by a set of beliefs, which constitutes an "explanatory framework" (Mishra & Brewer, 2003) for the schema. An explanatory framework is the

underlying, higher order mental structure that "glues together" pieces of information, which otherwise would remain unrelated or acausal (Mishra & Brewer, 2003). Following Kuhn (1999), a developed argument schema is supported by an epistemic model that recognizes the function and value of a rational argument as a means for choosing among alternative propositions or actions. Thus, an evaluativist epistemology provides the normative explanatory framework. In other words, individual argument schemas are more likely to be activated, accessed, and applied during a reasoning task if the learners have progressed to the evaluativist level of epistemological development. In a similar way, Kuhn (1999) suggested that advanced levels of epistemology are essential for engagement in argumentation, as they provide reasons for actually using the skills of argument when solving ill-structured problems.

Consequently, evaluativist epistemology is both the necessary context for dialogic teaching and an important learning outcome for the students. To explain how students develop their epistemologies through discussion, we again draw on the radical proposals of Vygotsky and others (Luria, 1981; Vygotsky, 1968; Wells, 1999), which state that language is not just a medium for articulating ideas, but it is an essential mechanism for *forming new ways of thinking and knowing*. When students deliberate about complex questions in a dialogic discussion, they encounter multiple and often competing lines of reasoning, characterized by different logical moves and related evidence (Paul, 1986). For example, the same fact of a story character firing a gun can be interpreted by different students as an attack or as an act of self-defense and then used to support alternative viewpoints. In a dialogic classroom, the merits of various arguments are evaluated in a public forum, as class members hold each other accountable to the shared standards of reasoning and evidence (Gregory, 2006; Paul, 1986; Sohmer et al., 2009). Students learn that their own views, as well as the opposing views of their peers, can be defended, defeated, or reconstructed using general principles of argumentation. This engagement in collective negotiation of alternative claims helps students to advance their epistemological beliefs. Students begin to see that knowledge is not simply handed down by authority figures (i.e., absolutist level). They also realize that not all viewpoints can equally withstand the scrutiny of rigorous public accountability (i.e., multiplist level). As students internalize the idea that knowledge claims can be judged based on the strength of arguments used to support them, they progress to evaluativist level of epistemology.

Functions of Argument Schemas

Research on schematic structures has identified important influences of a developed schema on perception, comprehension, learning, inferencing, and remembering (Anderson & Pichert, 1978; Bransford & Johnson, 1972; Chambliss, 1995; Cheng & Holyoak, 1985; Reed, 1993). Generalizing from this research, the functions of an argument schema should include facilitating argument comprehension, construction, and evaluation (Reznitskaya et al., 2008). Also, because argumentation supports knowledge creation in a variety of academic disciplines, argument schemas will affect student learning and performance across different school subjects, including language arts, science, and math (Alrø & Skovsmose, 2000; Duschl & Osborne, 2002; Kuhn, 2010; Reznitskaya et al., 2008). As students engage in collaborative inquiry, formulating, supporting, and challenging multiple interpretations, they acquire deeper, more complex disciplinary expertise. For example, students build more nuanced interpretation of a story character in a reading class, gain more sophisticated perspective on totalitarian societies in a history class, or develop deeper understanding of the concept of negative numbers in a math class.

Let us consider, for example, how students with developed argument schemas will respond to a task that calls for expressing an opinion on a controversial topic in a persuasive essay. To start, students' cognitive behavior will be guided by an evaluativist epistemological stance "that treats argument as worthwhile, as a fundamental path to knowing" (Kuhn, 1991, p. 201). According to Govier (1987), such a mind-set is

> illusive to many not encouraged to think about reasoning, argumentation, and the justification of claims. It is the sense that reasoning is going on, that there is an inference made from some propositions to others, and that this inference can be critically scrutinized. (p. 233)

This mind-set, along with the epistemological understanding of the requirements for knowledge justification, will help students to interpret the persuasive essay task as an example of unresolved inquiry, thus activating their argument schemas. Students will then proceed to make use of relevant "slots" in the schema. For example, students can be expected to articulate the main claim and support it with reasons. They will rely on a variety of argument stratagems that they have acquired from participation in inquiry dialogue, during which group members were held accountable to rigorous standards of reasoning and evidence. For example, students might introduce an opposing position in their essays with "Some people might say [COUNTERARGUMENT]." The general form of this stratagem and its function—an objection proposed by an imagined "someone"—would have been learned from prior experience with inquiry dialogue. As explained by Anderson et al. (2001), "thinkers must hear several voices within their own heads representing contrasting perspectives on an issue. The ability and disposition to take more than one perspective arises from participating in discussions with others who hold different perspectives" (p. 2). Note that the effective use of the stratagem requires a metalevel awareness that one's

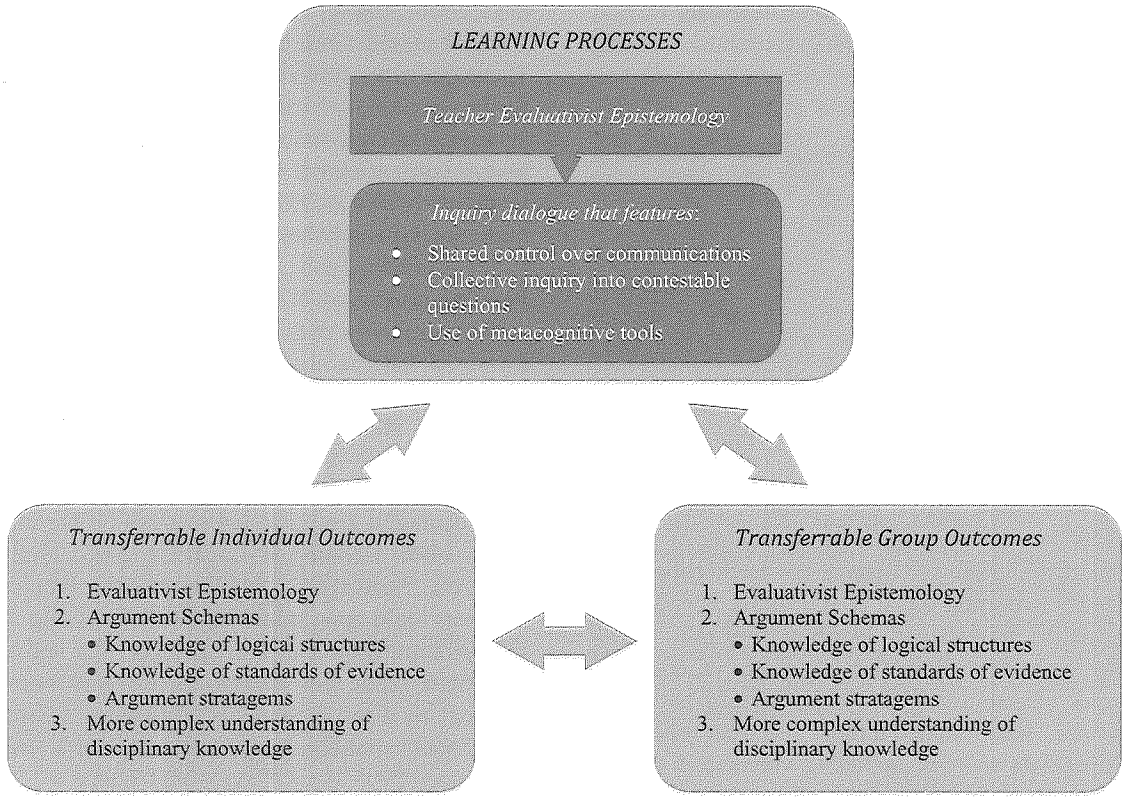

FIGURE 1 Theoretical model of teaching and learning through inquiry dialogue.

thinking about a given topic may be different from that of "some people." We suggest that this stratagem prompts students to come up with opposing perspectives that may not have been voiced otherwise. It also provides students with an effective means by which to incorporate counterarguments in their essays.

To summarize, our theoretical model, shown in Figure 1, accounts for learning processes and outcomes in a dialogic classroom for both individual students and a classroom community. Teachers with evaluativist epistemology create the necessary context for inquiry dialogue, supporting the use of normative participatory and discursive practices by classroom members. These practices include shared control over group communication, focus on collective inquiry into open-ended questions, and the use of metacognitive tools that help to regulate both processes and products of inquiry dialogue.

In a dialogic classroom, the capacities of the teacher and more advanced students become distributed among other members of the group, who observe, practice, and gradually internalize new ways of speaking and thinking. In other words, students transform interpersonal, external relations into intrapersonal mental functions, thus building their intellectual capacities. We have identified three transferrable learning outcomes in a dialogic classroom. First, participation in inquiry dialogue helps students develop beliefs about knowledge and knowing that are consistent with *evaluativist epistemology*. Evaluativist epistemology supports the activation and use of an *argument schema*, another outcome of dialogic teaching. A developed argument schema includes the knowledge of logical structures, standards of evidence, and stratagems useful in argumentation. Because schemas are abstract, they can be generalized across multiple contexts. Thus, students in dialogic classrooms should perform better on argument-related tasks that they encounter outside the dialogic circle. Third, by engaging in a collaborative inquiry in a variety of academic disciplines, such as reading, science, and math, students acquire more complex, nuanced, and personally meaningful *disciplinary knowledge*. Notably, in a dialogic classroom, not only are the three learning outcomes—evaluativist epistemology, argument schemas, and disciplinary knowledge—developed parallel to one another but each contributes to, and reinforces, the development of the others. Finally, in a cyclical process of individual and group transformations, students with more developed epistemologies, argument schemas, and substantive knowledge act to enhance the quality of inquiry dialogue in the collective. In other words, as members of a classroom community become more advanced in their intellectual capacities, they contribute new thought and language practices to group discussions, thus stimulating new rounds of development.

RESEARCH ON DIALOGIC TEACHING AND LEARNING

Features of Dialogic Classrooms

We begin the discussion of the empirical case for dialogic teaching by focusing on one aspect of the proposed theoretical framework that has been extensively studied by researchers, that is, typical patterns of interactions in dialogic classrooms. There is now a substantial body of evidence that describes verbal and social practices characteristic of inquiry dialogue (e.g., R. J. Alexander, 2003; Almasi, O'Flahavan, & Arya, 2001; Applebee et al., 2003; Billings & Fitzgerald, 2002; Chinn, Anderson, & Waggoner, 2001; Mercer & Littleton, 2007; Nystrand et al., 2003; Onosko, 1990; Reznitskaya et al., 2012; Soter et al., 2008; Taylor, Pearson, Peterson, & Rodriguez, 2003). For example, Billings and Fitzgerald (2002) used open and focused coding of videotaped classroom discussions to analyze consistent patterns of talk and identify important social relationships. Specifically, they evaluated the amount and distribution of talk, examined its purposes and functions (i.e., statement vs. question, different types of questions), and characterized participation formats (i.e., who initiated a topic and what followed). Using multiple data sources, including videotaped discussions, questionnaires, and interviews, the authors also distinguished among different roles of teachers and students. In another study by Chinn and Anderson (1998), the authors constructed "an argument network diagram" of student and teacher turns. The diagram allowed researchers to evaluate the quality of interactions on a variety of dimensions, including the breadth of arguments developed by the participants, the level of elaboration and explicitness, and the amount of collaboration among participants. In addition to substantive findings, these studies contributed important methodological knowledge that can help future researchers and practitioners to engage in a systematic study of communication as it happens in a classroom. Several recent publications summarized and critically reviewed various methodological approaches, highlighting their relative strengths and weaknesses (e.g., Marton & Tsui, 2004; Mercer, 2010).

In terms of substantive results, the research on dialogic teaching supports and expands the theoretical propositions outlined in Figure 1. Dialogic classrooms feature more egalitarian social organization, with authority over the content and form of discourse shared among discussion participants (e.g., R. J. Alexander, 2003; Beck, McKeown, Sandora, Kucan, & Worthy, 1996; Billings & Fitzgerald, 2002; Nystrand, 1997; Walsh, 2002). Students take on key responsibilities for the flow of the discussion. They participate in managing turns (self-selecting or nominating others), asking questions, judging each other's answers, introducing new topics, and suggesting procedural changes.

Studies also reveal that dialogic inquiry is prompted by and supported through the use of open-ended questions (Beck et al., 1996; Billings & Fitzgerald, 2002; Mercer & Littleton, 2007; Nystrand, 1997; Soter et al., 2008; Taylor et al., 2003). These questions serve to engage students in critical evaluation and analysis, offering them the experience of conducting genuine, firsthand inquiry. Students take on personal positions on the issues and support them with reasons, examples, and other evidence. They make lengthy, elaborate contributions, during which they explain their thinking to others (e.g., R. J. Alexander, 2005; Beck et al., 1996; Chinn et al., 2001; Reznitskaya et al., 2012).

Interactions in dialogic classrooms are characterized by metalevel talk, as class participants consistently reflect on and monitor the processes and products of a discussion. (Almasi et al., 2001; Applebee et al., 2003; Junker et al., 2006; Walsh, 2002; Wolf, Crosson, & Resnick, 2006). Teachers play an important role in supporting metalevel talk by providing meaningful feedback that inspires further inquiry (Beck et al., 1996; Henning & Lockhart, 2003; Nystrand et al., 2003; e.g., Scott et al., 2006; Walsh, 2002; Wolf et al., 2006). Teachers build upon student answers by asking for clarification, prompting for alternative perspectives, and encouraging students to relate their ideas to those of their peers in the discussion. As a result, students in dialogic classrooms get to participate in collaborative construction of knowledge (R. J. Alexander, 2005; Beck et al., 1996; Chinn et al., 2001; Junker et al., 2006; Mercer & Littleton, 2007). Students often "take up" the preceding contribution to further develop the group's reasoning. Their responses are "chained into coherent lines of inquiry" (R. J. Alexander, 2003, p. 37), as they listen to and react to each others' positions and justifications. Consider the following example of group reasoning, taken from our recent study of dialogic teaching (Reznitskaya et al., 2012). In this excerpt, fifth graders debate the question of whether students should be allowed to choose which school subjects they study.

Tammy	I agree with Rob that you should pick your classes in high school and college because when you get to high school and college, you're responsible enough to make your own decisions for what you want to learn. So . . . Brian.
Brian	Yeah, in high school and college, you should have a responsibility to pick what you want to do because if you don't pick something that you're going to need later, it's your fault. . . . If you do every class it's going to take a long time to get through. . . . Ann.
Ann	I disagree. Because in high school, let's say the last year when you're almost ready to get a job, what if you get a teacher—cause in high school they make you take some classes—so, what if you're going for math, like me. But then you get an English teacher who is really an inspiration, and she just made you *love* English. Now you have to go all the way back to high school, so that you can be a

major in English? And what Cindy said about the fashion designer, how she doesn't have to learn math. She does! Because what if they're saying, "You need three feet of this material to make a hat." And then she goes to the store and now she's buying two yards because she doesn't know how many feet are in a yard. She needs to know that.

Teacher You shook your head, so you're kind of agreeing with that?

Cindy Kind of, because I know I have to learn math because of the fashion thing.

In this excerpt, students provided lengthy explanations of their opinions, supporting them with reasons and examples. Moreover, students connected to one another's responses, collaboratively building a more nuanced answer to the discussion question. For example, Brian elaborated the position taken by Tammy, and Ann introduced a counterargument, which made Cindy revise her position.

Based on the volume and consistency of the findings on classroom discourse, we now have a theoretically grounded and empirically supported understanding of the types of linguistic and participatory practices that appear on a "social plane," or in a class discussion. Students in dialogic classrooms get to observe and use the tools of language and thinking that are required for effective engagement in reasoned argumentation. Less is known, however, about how these tools get appropriated and subsequently used by the students in new contexts, which is the topic that we turn to next.

Learning Processes and Outcomes

One of the more direct tests of the theorized processes of internalization *during dialogic discussions* was conducted by Anderson and his colleagues (2001). This study examined whether students participating in inquiry dialogue pick up and reuse effective argument stratagems that they see other children using. Sifting through 48 discussion transcripts, the researchers tracked the occurrence of 13 distinct stratagems. They concluded that the initial occurrence of a given stratagem increased the likelihood of its later use. The number of students who used novel language practices in the initial versus later discussions also increased, supporting the idea that students were able to acquire the "tools" of inquiry that were first introduced and modeled by their peers. For example, one of the stratagems examined in the study was a speech act intended to invite a classmate to speak, with a general form "What do you think [NAME]?" The initial probability of this stratagem being used in a discussion was low (.25). However, after the stratagem was introduced to the group, its likelihood of being used by other group members jumped to .83 and remained high. Further, the use of argument stratagems by children was not a matter of thoughtless mimicry. Instead, students seemed to have internalized important metalevel knowledge about "what the stratagem is good for, when to use it, and how to use it" (p. 4). For instance, one student changed the original form of the stratagem to "Would you like to share anything, [NAME]?" indicating that she understood "the deep structure of an invitation to participate rather than memorizing a string of words" (p. 15).

Anderson et al. (2001) noted that the concept of an argument stratagem combines "the notions of language form and language function" (p. 3). This, in turn, provided the researchers with new approaches to "tracking" students' development in social settings. We need more studies that generate evidence in relation to theorized psychological processes responsible for changes in student behaviors. For example, using an experimental design, a researcher can manipulate specific language practices by strategically introducing different argument stratagems into discussions, in order to examine whether and how these stratagems become adapted into individual argument schemas. Further, as discussion participants may internalize both normative and fallacious argument stratagems (e.g., appeals to tradition or emotion), we need more studies that examine how a teacher can engage students in evaluation and critique of argument stratagems that may seem effective but are, in fact, flawed and misleading.

Although the study by Anderson et al. (2001) offered initial insights into the process of internalization, it did not fully address the issue of transfer. That is, the researchers observed students using argument stratagems *during group discussions*. However, the question of whether these students have acquired knowledge that they can carry outside of the original learning context (i.e., group discussion) remains. That is, will students be able to *transfer* their generalized knowledge and skills to new tasks performed individually? Studies that examined transfer performance in dialogic settings generally report positive results, including improved reasoning (Kuhn & Udell, 2003; Mercer, Wegerif, & Dawes, 1999), increased inferential comprehension and argumentation about text (e.g., Murphy et al., 2009), enhanced quality of post-intervention argumentative writing (Applebee et al., 2003; Reznitskaya et al., 2001), as well as deeper conceptual understanding of disciplinary concepts and principles (e.g., Asterhan & Schwarz, 2007; Chinn, O'Donnell, & Jinks, 2000). For example, in our earlier study of a dialogic approach to reading instruction called Collaborative Reasoning (CR; Waggoner et al., 1995), we evaluated postintervention reasoning skills of elementary school students (Reznitskaya et al., 2001). In this study, students in three experimental classrooms participated in dialogic discussions using CR for a period of 5 weeks. These students did not receive any instruction in written argumentation. At the end of the 5-week period, students from experimental and matched control classrooms were given a written task requiring them to reflect on a dilemma faced by a story character. Student essays were compared in terms of the total number of elements composing an argument schema, such as supporting

reasons, counterarguments, and rebuttals. Students who experienced CR had a significantly higher number of argument components in their essays than their control counterparts. A qualitative analysis of selected essays further revealed that at least some CR students used specific argument stratagems introduced during the intervention, including "Some people might say [COUNTERARGUMENT]." We have suggested that it is the use of these language tools that helped students to consider and integrate alternative positions in their compositions, thus supporting an important shift from monologic to dialogic thinking.

Although generally positive, the evidence regarding student outcomes in dialogic settings is rather weak for several reasons. First, research investigating treatment effects in dialogic classrooms has many methodological limitations, such as small sample sizes, design and data analysis flaws, and less-than-ideal measurement tools. A recent extensive meta-analytic analysis of studies that investigated transfer effects from discussion of text to reading comprehension and reasoning in new contexts revealed that when researchers applied "best evidence criteria," they were able to find only four studies that showed positive transfer (Wilkinson & Murphy, 2011). The best evidence criteria included the requirements that the study (a) used an experimental or quasi-experimental design, (b) had at least "2 teachers and 15 students in each treatment group," (c) administered reading and/or writing posttests that were "*independent of the texts*" that students had previously discussed, and (d) reported pretest data about initial group difference or used random assignment of at least 30 units.

Thus, to enhance the quality of evidence on transfer performance, we need more research that has high methodological standards. Consider, for example, the issues related to the measurement of student outcomes following the engagement in inquiry dialogue. Previous studies often used postintervention measures that were too contextually similar to the learning situation (e.g., Dong, Anderson, Li, & Kim, 2008; Kuhn, Shaw, & Felton, 1997; Reznitskaya et al., 2001; Shipman, 1983). This research may be overestimating the effectiveness of dialogic teaching, as the documented gains may not generalize to other relevant contexts. As argued by Shepard (2000), "all too often . . . mastery appears pat and certain but does not travel to new situations because students have mastered classroom routines and not the underlying concepts" (p. 11). An important goal for future studies is to use postintervention tasks that do not depend on the assessment format being identical or even similar to the learning context, thus allowing for a more thorough examination of the transfer potential of dialogic teaching. Identified elements of an argument schema can help future researchers to design measurement tools that have important structural commonalities with dialogic instruction but vary in surface characteristics.

In addition, treatment effects in a number of studies were small and/or inconsistent across multiple groups, as well as depending on outcome measures and/or statistical procedures used (e.g., Dong et al., 2008; Mercer & Littleton, 2007; Reznitskaya, Anderson, & Kuo, 2007; Wegerif et al., 1999). Unstable results raise important issues about the robustness of internalized language and thought practices, as well as possible interactions between dialogic teaching and the characteristics of the group members, including their ability, gender, personality traits, and relative status (see also Cohen & Lotan, 1995; Schwarz et al., 2000; Webb et al., 2007). Inconsistent treatment effects also invite questions about the limits of group argumentation being a model for the development of individual reasoning. Kuhn (1992), a strong advocate of group debates, questioned "whether the generation and deliberation of alternative viewpoints in dialogic argument are sufficient conditions for the development of competent argumentative reasoning" (p. 176). One example of a promising addition to dialogic discussions is explicit instruction in abstract rules and principles of argumentation, presented in the context of oral debates. Several studies of explicit teaching of argumentation have found it to be beneficial for students' performance (Andrews, Torgerson, Low, & McGuinn, 2009; Crowhurst, 1987; Yeh, 1998), but more research is needed to help us better understand the ways in which dialogic discussions can be integrated with explicit teaching, or other instructional strategies, to promote the development of stronger skills and knowledge.

Finally, important theoretical propositions, such as the hypothesized mechanisms of internalization of individual psychological functions, remain largely unexamined, because studies that systematically analyze causal connections between the dialogic properties of discussions and the performance on transfer tasks are lacking. Research that investigated the relationship between dialogue and learning relied primarily on correlational techniques and often focused on measuring the mastery of disciplinary knowledge, and not argumentation itself (e.g., Applebee et al., 2003; Chinn et al., 2000; Veenman, Denessen, Akker, & Rijt, 2005). Nevertheless, these studies provide important insights into specific discourse features that potentially mediate student learning. For example, free exchanges of information among discussion participants, representing a "quintessential form of dialogic interaction," were positively associated with individual students' performance on a writing task scored for the displayed levels of abstraction and elaboration (Applebee et al., 2003). In the Chinn et al. (2000) study, more complex collaborative argument structures produced by the group discussing the functioning of electrical circuits were associated with individual transfer performance. Some researchers suggested that different features of dialogic interaction could lead to internalization of different individual outcomes (Chinn et al., 2000; Gage & Needels, 1989; Sugimoto, 1999). Although intriguing, this suggestion remains highly speculative. It needs to be researched further using methodological approaches that allow for the experimental manipulation of well-defined processes of instruction in order to test their influence on the individual performance on transfer tasks.

Student Epistemologies

Considered next is research on epistemological beliefs of the students. Studies examining the relationship between epistemology and student learning suggest that higher levels of epistemological development are related to students' active engagement, as well their use of more productive learning strategies (e.g., Bromme, Pieschl, & Stahl, 2010; Schreiber & Shinn, 2003; Simpsona & Nista, 1997). Personal epistemology also predicts individual performance on academic tasks. Students with more advanced epistemologies are more likely to better comprehend texts, to develop a deeper conceptual understanding of a given subject, to identify informal reasoning fallacies, and to construct arguments of higher quality (e.g., Kuhn, 1991; Mason & Scirica, 2006; Nussbaum, Sinatra, & Poliquin, 2008; Qian & Alvermann, 2000; Songer & Linn, 1991; Stromso & Braten, 2009; Weinstock, 2006; Weinstock, Neuman, & Tabak, 2004). For example, Mason and Scirica (2006) measured epistemological levels of middle school students using a task developed by Kuhn, Cheney, and Weinstock (2000). The task required participants to judge the truth-value of pairs of statements by responding to questions, such as "Can only one of these views be right, or could both have some rightness? Could one view be better or more right than the other?" Participants in the study exhibited two levels of epistemological development, multiplist and evaluativist. The researchers then assessed argumentation skills by asking students to generate arguments, counterarguments, and rebuttals about controversial topics (i.e., global warming and genetically modified food). Relating epistemological levels to performance on argumentation task, researchers showed that evaluativists generated arguments, counterarguments, and rebuttals of higher quality. This study, together with other research connecting student epistemologies to important academic outcomes, supports the theoretical claims outlined in this article, indicating that epistemological beliefs may act as general filters that direct one's cognitive functioning (see also Schreiber & Shinn, 2003).

Considering the potential significance of personal epistemology for student learning, it is surprising how little we know today about effective pedagogical practices that can bring about changes in epistemological beliefs. The theoretical model presented in this article, as well as other similar frameworks (e.g., Gutierrez, Rymes, & Larson, 1995; Paul, 1986; Wells, 1999; Windschitl, 2002), suggests that classroom discourse can influence the development of students' epistemologies. However, few studies have investigated this claim (e.g., Johnston, Woodside-Jiron, & Day, 2001; Kawasaki, Herrenkohl, & Yeary, 2004; Kuhn & Crowell, 2011; Valanides & Angeli, 2005). For example, in a qualitative study, Johnston and colleagues (2001) compared student epistemological development in two fourth-grade Language Arts classrooms, one with primarily dialogic patterns of discourse and the other with largely monologic patterns. Researchers observed that students in the two classrooms "held different views of what it means to be competent, the significance of technical competence, the significance of literate activity, the sense of agency in learning and knowledge production, and the significance they place on their own and others' experience" (p. 230). For instance, in a dialogic classroom students were "apprenticed" into developing a sense that literary knowledge comes from negotiation of viewpoints introduced by their peers, rather than from the teacher or the book. In contrast, students in a monologic classroom viewed literacy as the mastery of technical conventions of writing and the teacher as the only authority that can evaluate students' competence. The authors have concluded that classroom discourse not only affects the contents of substantive knowledge learned by the students, but also leads to internalization of different "routines of behavior and patterns of values, beliefs, roles, identities, and ways of knowing" (Johnston et al., 2001, p. 231).

In another qualitative study (Kawasaki et al., 2004), researchers examined epistemological development in an elementary science classroom by engaging students in carefully designed group activities. During these activities, students learned about sinking and floating by experimenting with various objects and then interpreting their observations through participating in a dialogic inquiry, orchestrated by the teacher. As the study progressed, researchers were able to observe gradual changes in students' epistemological stances. For example, students acquired more tolerance for ambiguity, began to accept the tentative nature of scientific claims, and added complexity to their understanding of the relationship between theory and evidence. Researchers concluded that students were able to develop more mature epistemologies because they "experienced science not as a collection of facts to be learned, but as a murky on-going endeavor for better explanations" (Kawasaki et al., 2004, p. 1314).

Thus, existing studies, although scarce, cautiously suggest that student epistemologies can be developed through instruction that centers around disciplined inquiry and deliberation of multiple viewpoints. We need to further analyze the mechanisms by which students acquire and change their views about knowledge and knowing, using different methodological approaches and measurement tools. In terms of measurement, we suggest that researchers move away from exclusively relying on self-reported measures, such as commonly used Epistemological Questionnaire developed by Schommer (1990) or similar tools (e.g., Schraw, 2001). Although Schommer's tool is simple and practical, it has been criticized for failing to capture the full complexity of the measured attribute and having limited validity evidence (Hofer & Pintrich, 1997; Schraw, 2001). With Schommer's measure, respondents are asked to endorse short, decontextualized statements about knowledge and knowing, which lack nuance and complexity (i.e., "the only thing that certain is uncertainty itself"). Because students are unlikely to have had many opportunities to examine their own epistemologies, they may remain largely unaware of their true beliefs

and are not capable of correctly reporting about them. Thus, the level of epistemological development may be best measured indirectly, such as with the use of strategically designed tasks and probing questions. Examples of such measures include the tools designed by P. M. King and Kitchener (1994); Kuhn (1991); and Kuhn et al. (2000). Another problem with measuring epistemology using questionnaires with universal statements about knowledge and knowing is that epistemic aims and knowledge structures may be highly context specific (Chinn, Buckland, & Samarapungavan, 2011). Thus, researchers need to use more refined and situated measures in order to gain a more nuanced understanding of multiple dimensions of students' epistemological development (Chinn et al., 2011).

Teacher Epistemologies

Studies of teachers' epistemologies show that the beliefs about knowledge and knowing are generally congruent with the pedagogical choices of practitioners (e.g., Richardson, Anders, Tidwell, & Lloyd, 1991; Schraw & Olafson, 2002; Sinatra & Kardash, 2004; Stipek, Givvin, Salmon, & MacGyvers, 2001). In the study by Johnston and colleagues (2001) discussed earlier, researchers found that teachers' epistemologies were directly aligned with their instruction, influencing the power relations between teachers and students and their interactional patterns, including the type of questions discussed and the feedback given to students. Specifically, during class discussions, the teacher with absolutist beliefs engaged students in highly monologic exchanges, characteristic of a typical recitation sequence.

> At no point do the students get control of the topic of discourse, represent themselves as knowers, or in engage in academic discussion in response to each other's comments. They offer information, but only to get the right answer and have it verified by the teacher. (Johnston et al., 2001, p. 226)

In contrast, in a classroom of the evaluativist teacher, authority was distributed: Students voted on the processes of the discussion, generated questions, and engaged with one another's ideas. In this classroom, "students expect to participate in shared knowledge production, and they value their own and others' experience in the process. The teacher actively undermines the singularity of her own authority or that of the text, which is evident in students' voices" (Johnston et al., 2001, p. 230).

However, the relationship between teacher beliefs and practice is not simple, and our understanding of it is far from complete. Several researchers have found that subscribing to more sophisticated ideas about knowledge and knowing might not always relate to the use of inquiry dialogue in a classroom (Alvermann et al., 1990; Schraw & Olafson, 2002). Alvermann et al. (1990) speculated that inconsistencies between endorsed epistemologies and classroom practices might happen when teachers are in the processes of changing their beliefs, with "changes in beliefs preceding changes in practice" (p. 579). Alternatively, Hofer (2002) suggested that teachers might hold conflicting beliefs about knowledge construction in different disciplines, and this, in turn, might lead to inconsistencies in their classroom behaviors. We need more studies that help to explain how different epistemological stances translate into teacher actions. What are the reasons for the documented inconsistencies between belief and practice? Why do even more enthusiastic practitioners, who embrace the underlying principles of dialogic teaching, struggle with actually using dialogue in a classroom (e.g., Billings & Fitzgerald, 2002; Richardson et al., 1991; Windschitl, 2002)? How do teachers' epistemological beliefs interact with those of their students (Hofer, 2001; Sinatra & Kardash, 2004)? One searches in vain for data-based answers to these questions.

If different levels of teachers' epistemological development lead to different pedagogical choices, then the subject of epistemology needs to be directly addressed through teacher education and professional development programs. Several scholars have argued for the need to help aspiring and practicing teachers to advance their theories of knowledge through the use of explicit instruction, personal reflection, and coaching (Richardson et al., 1991; Schraw & Olafson, 2002; Sinatra & Kardash, 2004; Windschitl, 2002). Yet only a few studies have evaluated the effectiveness of specific educational interventions, such as the use of autobiography (Bushnell & Henry, 2003) and incorporation of group discussions and journal writing about personal epistemologies in educational psychology courses (Brownlee, Purdie, & Boulton-Lewis, 2001; Hill, 2000). We need to develop and test instructional models that help teachers reflect on their epistemological commitments in relation to the advocated classroom practices.

The need for alternative models for teacher preparation is further underscored by the emerging evidence that college education, including teacher preparation programs, is not successful at advancing student epistemologies (Brownlee et al., 2001; Schraw & Olafson, 2002). One study even suggested that typical college courses in education might actually inhibit the development of more sophisticated epistemologies (C. A. King, Levesque, Weckerly, & Blythe, 2000). As argued by the authors,

> Although we do try to teach our students that knowledge evolves and can be best understood in context, the field of education as a whole is oriented towards teaching a body of knowledge which is valued in our culture and which we, as teachers, tend to accept as fact. (p. 7)

Similarly, Hofer (2001) concluded her review of research on personal epistemologies by suggesting that "our "educated citizenry" may in fact be largely composed of individuals who view the world from a position of absolutism, or who

simply accept a multiplicity of opinions about complex issues, seeing no need to support positions with evidence" (p. 369). It is possible that the ineffectiveness of teacher education programs in advancing epistemological understanding can account for the continued prevalence of monologic instruction in contemporary schools.

To summarize, empirical research on dialogic teaching and learning, although generally supportive of the proposed theory, is limited and occasionally inconsistent. This is troublesome, especially considering that much of the existing literature on the use of inquiry dialogue is focused either on its pedagogical promise (Freire, 1993; Lipman, 1988; Paul, 1986) or on essentially anecdotal accounts of its success (e.g., Barell, 2003; Fisher, 2001; Lindfors & Townsend, 1999). As a result, teachers may underestimate the complexity of dialogic teaching, while overestimating its effectiveness. To move from idealized descriptions of inquiry dialogue to its skillful application in their classrooms, teachers need to rely on a thorough, research-based understanding of dialogic instruction and its effects on student development.

TRANSFORMING CLASSROOM DISCOURSE

The use of the traditional recitation sequence has been broadly discussed, analyzed, and criticized in previous studies (R. J. Alexander, 2008; Alvermann et al., 1990; Cazden, 2001; Henning & Lockhart, 2003; Nystrand et al., 2003). This is why we chose another pattern of classroom communication to illustrate some of the challenges faced by today's practitioners. The following transcript comes from our recent study of classroom discourse in elementary school Language Arts classrooms (Reznitskaya et al., 2012). A novice teacher in this excerpt tries to facilitate a dialogic discussion of a story about the plight of African slaves.

Teacher	Who are slaves? When you think of slaves, what kind of people are really slaves, in your mind? Ah, Ellen?
Ellen	Like, they are, like um, in my mind, kind of, like, someone who really doesn't have the benefits of making their own choices, figuring out what they want to do, what their destiny should be. It's kind of somebody who really doesn't have any kind of freedom.
Teacher	Excellent. What do you think, Tim?
Tim	Um, people who work for others.
Teacher	OK. Doug?
Doug	People who are forced against their will.
Teacher	People who are forced against their will. Excellent, guys. Cane?
Cane	People who are forced against their will to work for somebody even somebody that they really don't want to.
Teacher	Victoria?
Victoria	People who are forced to do stuff by people who control them and, yeah . . .
Teacher	OK. Jon?
Jon	People who don't really get to think for themselves, and the others are just kind of controlling.
Teacher	OK. Edna? Good.
Edna	People who don't have any freedom.
Teacher	People who don't have any freedom. Good. Janet? [5 minutes later]
Jim	Well there isn't any reason why they [slaveholders] should be able to have slaves because everyone is equal, so it doesn't really make sense that someone just like . . . Like, they are all different, and one has to do everything what the other person says. It's just not fair.
Teacher	All right . . . Kelly?
Kelly	Might be that the slave masters, probably, might have thought that they were not as good as them. Maybe, the slaves were better than them.
Teacher	OK, that's an interesting point. Let's see . . . Tim?
Tim	The owners kind of owned them, I think like, maybe, they thought that they were so much powerful, they could do everything and that probably anyone else couldn't do anything.
Teacher	OK. Good. Todd?
Todd	Well I don't think that anybody has the right to mistreat anybody else, because like we were all created equal and we are all the same person, and it does not matter what color our skin is or what color our hair is. It's just like we are all the same.
Teacher	OK, good. Cane?
Cane	Like there should be no reason that somebody must mistreat anybody. They must treat somebody how they want to be treated, and, say, like the person who was the slave was the slave master, how would they like it if they were made to work like slaves?
Teacher	Good. Sal?
Sal	Well, nothing gives the right to people who mistreat others, because like the slaves difference shouldn't be. . . . Like create a big problem and stuff like that.
Teacher	OK. Eleanor?

The preceding excerpt started with a teacher asking students a truly open-ended question (i.e., "Who are slaves?"). She did not seem to have a specific answer in mind, and proceeded to solicit multiple ideas from a large number of students. Unfortunately, as the discussion developed, it became clear that although this teacher abandoned the traditional recitation script, with its heavy use of factual, test-type questions, she has not yet developed an appropriate alternative. Perhaps, this teacher's intent to be "constructivist" immobilized her, leaving her with very limited functions as

a discussion facilitator: providing superficial feedback (e.g., *Excellent, OK, Good*) and nominating the next speaker. The discussion remained superficial because students had limited opportunities to work with one another's ideas. They simply stated what they think in a sequential fashion, essentially disregarding the input of others. Student ideas were treated as merely opinions, rather than as hypotheses to be taken up, tested, and reconstructed. The lack of consideration for what had been said by others produced many repetitive statements, as demonstrated, for example, by the remarks of the three students at the end of the excerpt, as they rehashed the idea of people having no right to mistreat others.

It could be argued that as teachers discard the most basic, absolutist views of knowledge and learning, they progress next to the intermediate, multiplist, stage of epistemological development. Because multiplists consider all viewpoints to be equally acceptable, there is no need to coordinate or evaluate them through the use of reasoning and reflection (Kuhn, 1991). In the excerpt just presented, students had more opportunities to talk, compared to a traditional classroom. However, their contributions received no further scrutiny by the group, and the time was spent on the sharing of opinions, which remained unexamined and disjointed. R. J. Alexander (2008) termed this sad new reality a "pseudo-enquiry." Possibly prompted by increasingly influential, but not fully understood educational theories that focus on "knowledge discovery by learners," many teachers move away from recitation. Unfortunately, they then end up engaging students in "an endless sequence of ostensibly open questions which stem from a desire to avoid didacticism, are unfocused and unchallenging, and are coupled with a habitual and eventually phatic praise rather than meaningful feedback" (R. J. Alexander, 2005, p. 3). In a similar way, Elmore, Peterson, and McCarthey (1996) observed a teacher in science classrooms set up an "exciting, hands-on activity" that offered students multiple opportunities for inquiry learning. Regrettably, the teacher then failed to engage students in disciplined deliberation of various viewpoints, thus leaving them "with different discoveries and understandings of their findings" (p. 41).

The problems experienced by teachers who try to use innovative instructional approaches, advocated by theorists and researchers, raise serious questions about the effectiveness of professional preparation programs. The key goal of teacher education is to help practitioners develop coherent pedagogical frameworks that integrate both theoretical and practical knowledge. Real transformation of classroom communication will happen only when teachers

> think differently about what is going on in their classrooms, and are provided with the practices that match the different ways of thinking. The provision of practices without theory may lead to misimplementation or no implementation at all. . . . Changing beliefs without proposing practices that embody those theories may lead to frustration. (Richardson et al., 1991, p. 579)

More research is needed to determine how professional preparation programs can help teachers to acquire a well-balanced mix of relevant beliefs, knowledge, and skills.

It is also important for preservice and in-service teachers to learn how abstract theoretical principles about knowledge, teaching, and learning can be transformed into specific classroom practices. There are several well-established pedagogical models centered around inquiry dialogue that have theoretical and empirical foundations, as well as curriculum materials to support classroom applications. Examples include Philosophy for Children/Community of Inquiry (Gregory, 2006; Lipman, 1988), Collaborative Reasoning (Waggoner et al., 1995), Accountable Talk (Wolf et al., 2006), and Thinking Together (Dawes, Mercer, & Wegerif, 2003). Unfortunately, these and similar *comprehensive pedagogies* have not been widely shared with teachers. Instead, many teachers adopt isolated novel activities or strategies, such as small-group discussions, without fully appreciating the underlying meaning of these practices (Fullan, 1991; Windschitl, 2002). This leads to the distortion of the original intent. Providing comprehensive, rather than fragmented, curriculum support may lead to more meaningful changes in teachers' language use in a classroom.

In a discussion of key principles of successful professional development programs, Elmore (2002) convincingly argued that "few people willfully engage in practices that they know to be ineffective; most educators have good reasons to think that they are doing the best work they can" (p. 19). Thus, practitioners need opportunities to reexamine their own teaching through systematic and critical study of their classroom communication (Walsh, 2002). However, merely engaging teachers in viewing videotapes of their lessons may not bring about the desired changes in beliefs and practices. In a revealing study by Alvermann et al. (1990), teachers did not seem to notice any contradictions between their expressed commitment to hold "open-forum discussions" and the actual use of recitation in their classroom, even when they were invited to watch the videotapes of their interactions.

Thus, teacher training should support practitioners in becoming more cognizant of their language use and critical about their pedagogical choices. Wilkinson and colleagues (2010) recently discussed an example of a professional development program designed to help practicing teachers learn to enact dialogic discussions about text and "to make judgments about the quality of talk" (p. 6). During the program, teachers met individually with their "discourse coaches" to view the videos of their classroom interactions, using an observational measure of talk. Discourse coaches encouraged "dialogue about videotaped discussions" by focusing teacher's attention on the important features of discourse through the use of the observational tool (Wilkinson et al., 2010, p. 9). "For example, if the teachers made an observation about an aspect of discourse . . . the coach might extend the teacher's observation with an example from the video or a teaching point that might further understanding of the

discourse" (p. 9). The authors have discussed the importance of comprehensive professional development programs, during which teachers are not only provided with the needed instructional materials (i.e., an observational measure of talk) but also coached to use these materials so that they can engage in a meaningful reflection about language and learning.

To conclude, the pedagogical promise of dialogic teaching continues to appeal to many educators concerned with empowering their students to become independent thinkers and active citizens. However, our understanding of this inherently complex educational practice is incomplete and imprecise. Further, efforts to transform the traditional language of schooling have not produced the desirable changes; and recitation and, more recently, pseudo-inquiry continue to dominate teacher–student communication (R. J. Alexander, 2008; Nystrand et al., 2003). Through integration of multiple fields in educational research, this article presented a comprehensive theoretical account of dialogic teaching and articulated testable predictions regarding the changes in students' personal epistemologies, argument schemas, and substantive knowledge, as a result of their engagement in reasoned discourse with peers.

We have also argued for the need for more empirical studies that examine causal connections between language and learning; connect multiple strands of research, such as epistemology and classroom discourse; analyze dialogic interaction in combination with other instructional approaches; rely on valid measurement tools; and investigate the necessary changes in teacher education. Current difficulties with promoting dialogic teaching in schools should not lead us to abandon this method because potentially and occasionally it creates classroom experiences that are authentic, inclusive, and rational. To collaborate with others in a process of shared inquiry, to possess a general argument schema and use it in relevant situations, to hold sophisticated beliefs about the negotiated nature of knowledge, and to be willing to reconsider and reconstruct previously held commitments when encountering good reasons to do so: These capacities are central not only to academic achievement but also to living a meaningful life and to playing an active role in resolving various controversies that continually arise in a civil society. We can only benefit from helping our teachers and students embrace inquiry dialogue in their classrooms.

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