Cite as follows:

Resnick, L. B., Asterhan, C. S. C., & Clarke, S. with Schantz, F. (2018). Next Generation Research in Dialogic Learning. In: G. E. Hall, L. F. Quinn & D. M. Gollnick, (Eds), ***Wiley Handbook of Teaching and Learning*** (pp. **323-338**)**. Wiley-Blackwell.**

13

Next Generation Research in Dialogic Learning

Lauren B. Resnick
Learning Research and Development Center, University of Pittsburgh

Christa S. C. Asterhan
Hebrew University of Jerusalem

Sherice N. Clarke
University of California San Diego with Faith Schantz

Abstract:

A small but powerful body of evidence shows that certain forms of classroom discussion can produce learning gains that go beyond the topics actually discussed. In a range of countries, students who engaged in dialogue showed better initial learning and retained their learning gains for longer periods when compared to untreated comparison groups. In some cases, students who were engaged in learning through dialogue even outperformed their untreated counterparts. In this chapter, we review the evidence and consider why dialogue might produce these effects, looking at both cognitive and motivational-social explanations. Despite evidence of the surprising and robust effects on student learning, it is rare to find dialogic teaching in the classroom. We propose explanations for the resistance to it, from individual teachers and from the system, and suggest that opening up opportunities for more students to learn through dialogue will require researchers and practitioners to work together in new ways.

Key Terms: classroom dialogue, classroom discussion, dialogic teaching, argumentation, Accountable Talk, academically productive talk, dialogic pedagogy

Introduction

An extraordinary wind is blowing in research on learning. Since the turn of this century, there has been an explosion of interest in the role of talk and dialogue in learning and teaching. The number of journal articles turned up by a Google Scholar search of "classroom dialogue" has

quadrupled.[1] Papers now appear in a wide range of journals and in multiple languages. Sessions are held at conferences devoted to different fields of education research (e.g., AERA, APA, EARLI). Teachers are offered multiple workshop opportunities. And a number of edited volumes have been published, all on the topic of classroom talk.

The extent to which this interest has translated into significant change in the classroom is still uncertain. And despite the new focus among scholars, the number of studies showing positive effects for dialogic teaching is still small. We cannot point to a large body of evidence that "proves" the benefits of dialogic teaching. Yet the evidence we do have is powerful. It shows that structured discussions, disciplined by shared standards of reasoning, can produce learning gains that go well beyond the topics actually discussed.

In a review of studies from a range of countries, we have found four kinds of effects from dialogic teaching. Students who had opportunities to debate their ideas with classmates learned more of the content under study *(better initial learning*) than students who experienced traditional teaching. Their learning gains endured longer (*retention*). And sometimes they outscored their peers in domains that had not been taught through discussion (*far transfer*), and on tests of reasoning skills (*general intelligence*). These are results with far-reaching implications, both for the classroom and for scholarship into the nature of learning.

In this chapter, we look briefly at how language, specifically dialogic talk, came to influence theories of learning. We then consider a sampling of the evidence on the effects of dialogic teaching and learning. We propose a range of possible explanations for these effects, from several perspectives. Finally, we speculate on why dialogic teaching has not become widespread,

[1] This statement is a comparison of the number of journal articles produced by the search term "classroom dialogue" published between 1900 and 2000, and between 1900 and 2016. The search was conducted in July, 2016.

and suggest next steps for both practice and research.

Language and Learning

The shift toward interest in dialogic teaching and learning began in the early part of the twentieth century. A distinguished American philosopher and social psychologist, George Herbert Mead, described thought as "the conversation of the generalized other with the self" (Mead, 1934). In Mead's formulation, thinking served as a rehearsal for an actual act of communication; therefore, it always occurred in relation to others. This idea was not immediately taken up in the U.S. or Western Europe. However, while Mead's work was underway, in a separate line of research, Soviet psychologist Lev Vygotsky and his colleagues were developing and elaborating a similar theory. Vygotsky argued that thought and language were intimately related. Language was a tool that could help thinking develop. The notion that language can be used as a tool in the service of intellectual development was a radical idea, as it called into question what we "do" with language in schooling, and how language might be used to structure schooling and development more broadly.

The Soviet work did not come to the attention of scholars in Europe and America until the 1960s, when it became available in translation (Vygotsky, 1962, 1978). (Interest in Mead's work was also revived in the 1970s.) Several decades after these works were published, the idea that language and interaction were central to thought had not become less revolutionary. In fact, it would dramatically change many scholars' views of learning.

As scholars grappled with these new ideas, sociologists and anthropologists working in several languages and academic cultures began to probe the *centrality of talk and argument* in learning outside of school. Developmental psychologists showed that elements of reasoning and argument were present in the talk of even very young children (Michaels, O'Connor, & Resnick,

2008). Scholars from other disciplines looked at argument in settings such as supermarkets (Lave, Murtaugh, & de la Rocha, 1984), little league baseball practice (Heath, 1991), and family dinner table conversations (Pontecorvo & Fasulo, 1997). Others showed how teams of adults guiding ships into harbor (Hutchins, 1995) or working in airports (Suchman, 1997) and subway stations (Heath & Luff, 1992) used argument-based language patterns to achieve a desired practical result.

At about the same time, linguists began to examine classroom talk—identifying patterns, documenting the proportion of teacher talk to student talk, and studying the content of talk. Gradually, a hypothesis appeared that *talk itself* could support learning. Because schools had historically been given the task of teaching language, this was a potentially earth-shaking flip in educators' understanding of the relationships among language, schooling, and learning. This view came to upend our most basic assumptions about:

- how children come to "know" language
- how language is used to explain ideas
- what kinds of talk are capable of expanding children's understanding
- how and what children are able to learn at different stages of schooling
- who should have the right to speak and be heard in school

Evidence began to appear showing that certain forms of classroom talk improved subject matter learning. Sometimes, classroom talk led to measurably longer *retention* of learning than psychologists and other learning researchers are used to documenting. And—a bigger surprise—some studies showed *transfer* to other domains of knowledge. For example, students taught science or math by a discussion method outscored their peers on national and state tests of English. Students' scores even rose on intelligence tests that had been specifically crafted to be

insensitive to direct instruction.

Positive results did not occur every time, or even most of the time. But more studies kept appearing, along with theoretical analyses that offered explanations of their results. These explanations reached outside the established and dominant psychological theories that attributed learning to direct instruction on a small body of knowledge "owned" by the teacher. It became clear that psychologists alone could not successfully investigate what was going on.

Focusing Research on Talk-based Learning

In 2009, we began a process of seeking out research that examined talk-based learning in schools across the world. We asked scholars to send us published and unpublished reports that examined the effects of teaching experiments that engaged students in discussions on any academic subject matter. We also asked each scholar who else we should send our request to. By 2011, we had collected enough evidence to hold an invited conference, sponsored by the American Educational Research Association (AERA), that drew researchers from across the globe.

Scholars of education, cognitive psychology, educational psychology, linguistics, and computer science came to Pittsburgh not to discuss the latest results from laboratory experiments, but to look within classrooms, from the U.S. to the U.K., Australia to China. What was the nature and quality of the talk in these classrooms? How did teachers initiate and sustain it? Which conditions supported it and which shut it down? How did talk produce greater learning for students—many of whom were from low-income families, ethnic minorities, and/or language minorities—compared to their peers? How do we document and study the spoken language of children? We considered whole class and small group discussions and settings in which students "conversed" with computers. Throughout, we gave plenty of attention to negative results (lack of retention and transfer) although we were unable to systematically collect such

studies and compare them with those that were showing at least some positive results.

In 2015, AERA published a book based on the conference, *Socializing Intelligence Through Academic Talk and Dialogue* (Resnick, Asterhan, & Clarke, 2015). The talk described in the individual chapters is given different names but shares common features. In dialogic learning, students think out loud about a complex problem that requires collaboration: noticing something about the problem, questioning a surprising finding, or articulating, explaining, and reflecting upon their own reasoning. The teacher works to elicit a range of ideas, which may be only partially formed in students' minds. With teacher guidance, other students take up their classmates' statements: building on, challenging, or clarifying a claim (including a teacher's claim); posing questions; reasoning about a proposed solution; or offering a counter claim or an alternate explanation. Overall, the teacher's goal is to sustain a *teacher-led* but *student-owned* process of shared reasoning that ultimately results in a more fully developed, evidence-backed conclusion, solution, or explanation.

This approach goes by different names, including *academically productive talk*, *dialogic teaching and learning*, *dialogic pedagogy*, and *argumentation*. Here we use the term "Accountable Talk,"[2] introduced by Michaels, O'Connor, and Resnick (Michaels, O'Connor, & Resnick, 2008; Resnick, Michaels, & O'Connor, 2010), to represent forms of talk that fit the description above. Accountable Talk is so named because its critical features fall under three broad dimensions: accountability to *reasoning* (providing a rational justification for a claim), accountability to *knowledge* (getting the facts right even if it is a struggle to find the right wording), and accountability to the *learning community* (respecting the ideas and feelings of classmates). All three must be present for deep learning to occur.

[2] Accountable Talk is a registered trademark of the University of Pittsburgh.

Evidence for Improved Learning via Accountable Talk

Our criteria for the kinds of data we take as "evidence" that talk-based pedagogies can improve learning include the following:

- Data showing that students participating in talk-based instruction scored higher than appropriate control groups on tests of the **material taught** and on new tasks **within the domain**
- Data showing greater **retention** of what was taught over significant periods of time (again with appropriate control groups)
- Data showing **transfer** to topics or subject matters not taught through a discussion method
- Data showing improvement in widely accepted forms of **reasoning**
  or tests of **general intelligence**

Data of these kinds exist for each of the main subject-matters of the school curriculum: literacy, math, and science. They exist for instructional strategies that include whole class teaching, teacher-organized small group discussion, and computer-mediated dialogue. We report here on a sampling of published studies that illustrate a range of subject matters, instructional processes, and research designs. Our review will necessarily be brief, but much more evidence and discussion can be found in Resnick, Asterhan, and Clarke (2015).

Reading Comprehension Studies

Our review begins with reading/English language arts (ELA) studies because these disciplines have long been considered foundational for all learning as well as for participating in virtually every domain of work and public life. An indicator of the perceived centrality of language arts in the school program is that reading, writing, and social studies (the language-based disciplines)

command much more instructional time than mathematics and science in elementary and middle school curricula.

Wilkinson, Murphy, and Binici (2015) provide a helpful review of studies in reading comprehension. They begin by reporting on Murphy, Wilkinson, Soter, Hennessey, and Alexander's meta-analysis (2009) of 42 quantitative studies on the effects of guided text discussion on learning, using nine major approaches to teaching through discussion. On measures of teacher and student talk, researcher-developed measures of comprehension (such as persuasive essays), and standardized tests of reading comprehension, Murphy et al. found a wide range of effect sizes for literal and inferential comprehension, critical thinking, reasoning, and argumentation. Effect sizes tended to be highest for measures of teacher and student talk, and lowest for standardized test scores.

We interpret these findings as evidence that dialogic methods can help students practice the skills and habits that are traditionally valued in ELA classrooms. The results support claims that dialogic teaching can be used to increase performance in the classroom. But what is the evidence that such classroom performances transfer to new texts and interpretive tasks, and to standardized test scores?

Wilkinson et al. reviewed several studies that examined this question. They initially examined *correlational* (as opposed to *intervention*) studies. Among these, Applebee, Langer, Nystrand, and Gamoran (2003) found that discussion practices involving challenging reading tasks were positively related to students' writing performances. Earlier, Langer (2001) had shown that small-group and whole-class discussion was one of the characteristics of schools with overall higher than expected ELA achievement. Taylor, Pearson, Clark, and Walpole (2000) and Bitter, O'Day, Gubbins, and Socias (2009) found that teachers' use of higher-level questions

predicted students' greater reading achievement in high-poverty schools. No *causal* link is proven by these studies, but they do show an *association* between dialogic instruction and higher achievement.

Wilkinson et al. also identified nine *intervention* studies that involved dialogic teaching of reading. Two of these—*Questioning the Author* and *Junior Great Books*—were intended to improve reading skills. Two others—*Collaborative Reasoning* and *Philosophy for Children*—aimed to develop reasoning skills through textual engagement. We will discuss them later.

Questioning the Author (Beck, McKeown, Sandora, Kucan, & Worthy, 1996; Beck & McKeown, 2006; McKeown & Beck, 2015) is an approach to book discussion that is based on current theories of the comprehension process. At key points during the reading of a text, a *Questioning the Author* teacher will pause to ask questions such as, "What's going on here?", "How does that connect to what we read earlier?", or "How does what Kim said fit in with what David noticed back on page 4?" Reviewing two studies of the program, Wilkinson et al. found the effects to vary from -0.09 for "comprehension monitoring" in one study to 0.47 for "recall of transfer text" in the other.

Two other chapters (McKeown & Beck and Matsumura & Garnier) in Resnick, Asterhan, and Clarke (2015) speak to the effectiveness of *Questioning the Author*. McKeown and Beck note that their studies of the program's implementation showed that over time teachers' questions focused more on meaning, and class discussions involved more connections and responses to others' statements, compared to baseline lessons. Matsumura and Garnier report on two years of a randomized controlled trial of a literacy coaching program in a district that used *Questioning the Author*. Over the course of the study, English Language Learners in the intervention significantly raised their reading achievement.

Junior Great Books (Great Books Foundation, 1987) is a literacy development program that engages students in reading texts that are widely considered to be the "Great Books" of western civilization. The program involves students in interpretive discussions of stories with enduring themes, as well as vocabulary study, directed note-taking, and writing about the theme, all in a process known as "shared inquiry." Although *Junior Great Books* began as a program for children identified as "gifted," it was later used with success in previously low-achieving urban schools (Wheelock, 2000). For *Junior Great Books*, Wilkinson et al. report effect sizes from 0.44 to 0.46 for vocabulary and critical thinking/reading.

As Wilkinson et al. note, this is a small number of studies, and only two of the nine involved random assignment of students to conditions. They also note that the question of why results transfer to new texts and tasks had not systematically been investigated. Overall, the authors conclude that there is sufficient evidence to claim that discussion can help students better understand the text at hand, but that "the jury is still out" on whether—and why—discussion of one text produces greater ability to understand new texts in the future.

Math and Science

Surprisingly for many, it has been guided discussions of mathematics and science problems that have shown the greatest transfer effects, including transfer to other disciplines (*far transfer*), sometimes several years later (*long-term transfer*). Two of the earliest demonstrations of improved learning and transfer in mathematics come from studies of the work of classroom teachers who used what we now call Accountable Talk methods in primary grade teaching of math.

Project Challenge was developed by master teacher Nancy Anderson and scholars at Boston University for one of the lowest-performing school districts in Massachusetts (Chapin &

O'Connor, 2012; O'Connor, Michaels, & Chapin, 2015). The intervention provided elementary school students with complex problems, projects, and arithmetic learning through games, and focused on getting students to explain their mathematical thinking. After one year, 57% of *Project Challenge* students scored "Advanced" or "Proficient" on the Massachusetts state mathematics test, compared with only 38% in Massachusetts overall. After three years in *Project Challenge*, 82% of students scored in the "Advanced" or "Proficient" ranges on the state test, compared to only 40% for Massachusetts sixth-graders overall. In a post-hoc comparison study, the researchers also looked at ELA scores on the state test for a smaller group of *Project Challenge* students and a control group. Surprisingly, they found that *Project Challenge* students' ELA scores were also much higher than those of the control group, although the intervention took place only in math classes. Effect sizes for both math and ELA were over 1.1.

In one of the earliest examples of dialogic teaching that produced transfer, Victoria Bill, an exceptional teacher in an inner city Catholic school in Pittsburgh that served mainly African-American students, worked with a group of researchers to create lessons that involved elementary school students in a process of shared mathematical reasoning (Resnick, Bill, Lesgold, & Leer, 1991; Bill, Leer, Reams, & Resnick, 1992). The lessons began with whole-class discussion of a problem situation within a real-world context, followed by team work and more discussion as each team reported out. The researchers saw dramatic change after only a few months. At the beginning of the school year, only about one-third of first graders could count orally to 100, or solve small-number addition problems. By December, most students could perform multi-digit addition and subtraction problems successfully, and at least half were using invented procedures that showed they understood the underlying math. On the California

Achievement Test, Bill's first-grade students' scores jumped from about the 25th percentile to the 80th percentile in math. Her second graders' scores rose similarly. And both cohorts' scores also rose in reading, from about the 25th percentile to the 45th percentile or above, although reading had not been part of the intervention.

Perhaps the most startling, when their research was first reported, were studies in British schools by Philip Adey and Michael Shayer on what they termed *cognitive acceleration*. Cognitive Acceleration through Science Education (CASE), for students aged 11 to 14, featured intervention lessons based on Piaget's schemata of formal operations, including ratio and proportionality, probability, and so on (Adey & Shayer, 1990, 2015). A core principle of the intervention was *cognitive conflict*: the idea that the mind develops in response to stimuli that disrupt existing structures and cause new structures to form (Piaget & Inhelder, 1969). Therefore, the lessons were constructed around problems that resisted shallow interpretations or quick resolution.

The researchers did not see strong results on school performance when students were first tested. But when students who had participated in CASE took the British national examinations (GCSEs) as 16 year-olds, they performed significantly better than students of similar social and educational backgrounds who had not participated in CASE (Shayer, 1999). The CASE group outscored other students not only in science, but also in English and mathematics. The researchers were able to expand CASE to many more schools, with similarly positive results (Adey & Shayer, 2015).

Taken together, these are effects of surprising magnitude and duration. It appears that

talking through problems in math and science can produce learning gains that go well beyond the subjects taught.

Logic and Reasoning

Although there are no labeled courses or subject matters in the standard K-12 curriculum that are charged with teaching reasoning and logic skills, there has been substantial research on ways of developing such abilities (cf. Kuhn, 2005; Kuhn & Zillmer, 2015). Two such programs have shown transfer effects of considerable interest: *Philosophy for Children* and *Collaborative Reasoning.*

Philosophy for Children, originated in the U.S. by Lipman (1981, 2003), aims to develop students' critical reasoning skills through dialogue about philosophical questions, such as "What is truth?," "What is happiness?," or "Is it ever right to deprive someone of his/her freedom?" Starting with a text or another stimulus (such as a video), the teacher guides students through a dialogic process in which they are encouraged to question one another, to consider multiple answers to a question, to justify their own opinions with reasons, and to change their minds based on the worth of someone else's argument.

Topping and Trickey (2015, 2007a, 2007b) studied a variant of *Philosophy for Children* that was implemented in a school district in Scotland. The Cognitive Abilities Test (CAT), a standardized test of general intelligence, was administered before the intervention and twice afterward. The experimental group showed significant gains between the pre-test and the first post-test, in verbal, nonverbal, and quantitative reasoning abilities, while the control group showed none. The experimental group maintained these gains for two more years, despite no further intervention, while the control group's scores went down. *Philosophy for Children* does not involve nonverbal or quantitative reasoning; therefore, the results can be considered to be

evidence of transfer.

A more recent, larger study (Education Endowment Foundation, 2015) of a year of *Philosophy for Children* implementation in a range of schools in England showed similar but less spectacular results. On the national Key Stage 2 tests in both reading and mathematics, scores showed a positive impact of the program, with economically disadvantaged students making the biggest gains. Overall, *Philosophy for Children* students gained an additional two months' attainment. Scores on the CAT, however, showed a smaller positive impact of the program, compared to Topping and Trickey's studies. The transfer to CAT benefit was significant only for relatively advantaged students.

Collaborative Reasoning (Anderson, Chinn, Waggoner, & Nguyen, 1998; Chinn & Anderson, 1998) engages students in discussions of ethical dilemmas, public policy questions, or issues of science that are posed in stories. In small groups and in whole-class discussions, students take positions on the "big question" of a story (e.g., "Are zoos good places for animals?"), learn to argue for and against their positions, and build arguments together. While discussions are carefully structured and monitored by teachers, over time children take on some leadership functions, including encouraging others to participate and monitoring progress. Sun, Anderson, Lin, and Morris (2015) have looked at how leaders emerge in *Collaborative Reasoning* discussions, and Anderson et al. (2001) have documented the way argument stratagems spread from one child to another during discussions.

In a study involving children in Mideast China, Sun, Anderson, Perry, and Lin (in press) investigated whether or not the social skills involved in being a discussion leader would translate to a new group and a different task. On a mathematics task that involved spatial reasoning, students who had previously engaged in *Collaborative Reasoning* made more effective

leadership moves and produced significantly better problem solutions compared to a control group. *Collaborative Reasoning* discussions do not include mathematics—therefore these results can also be interpreted as transfer.

Why Might Dialogue Produce These Results?

Several attempts have been made to explain the results of dialogic teaching on student outcomes, ranging from cognitive to more motivational-social accounts.

First, dialogic learning involves a shift in pedagogical thinking from valuing an inert, correctly stated "right answer" to valuing the thinking process, even if this entails considerable struggle. If the goal is to put an idea on the table, then its form of expression is less important than its content. If the goal is to contribute to an argument, then emergent and half-formed ideas and statements are accepted as a valid contribution to the process. This shift in focus opens up many more possibilities for student participation.

Second, students engage actively with content, rather than passively. They are asked to reason about content, rather than to memorize facts or follow rules to solve a string of similar problems. Over time, they develop a repertoire of reasoning skills (Koedinger & Wiese, 2015) and stratagems (Reznitskaya et al., 2008), such as "If I'm considering a claim, search for evidence against it," and "If given evidence against a claim, find a counterargument." With practice, these skills and stratagems become increasingly refined, and available to be used in other settings (Koedinger & Wiese, 2015).

Third, Nussbaum and Asterhan (2016) have proposed that participation in classroom argumentation strengthens an even more basic set of capacities, those known as *proactive executive control strategies*. These strategies involve intentionally activating or inhibiting certain cognitive processes. Recent findings have shown that the acquisition and strengthening of these

strategies can transfer to tests of fluid intelligence (Taatgen, 2013). Nussbaum and Asterhan suggest that similar processes may be at work during argumentation-rich activities. For example, when one is considering someone else's counterargument, one has to "protect the mind" from interference by one's argument, and then switch attention back to one's argument to advocate for or to evaluate it.

Fourth is a Vygotskyian explanation that suggests the structure of talk in the classroom shapes what students think is expected of them. Some (e.g., Greeno, 2015) argue that the form of the question evokes from students the cognitive processes needed to respond. Thus when a teacher says to a student, "I'm not sure I have your thinking right. Are you saying…?," the student is prompted to re-evaluate and possibly further self-explain or elaborate on his or her proposition. By contrast, a question such as "What is the answer to question 5?" may only prompt identification of an already worked-out solution.

Fifth, a *growth mindset* (Dweck, 2006)—the belief that working through intellectual challenges makes the brain smarter—is implicit in the dialogic classroom. Decades of research have shown that students who believe that the mind can grow are more successful academically than those who see intelligence as fixed (Blackwell, Trzesniewski, & Dweck, 2007; Yeager & Walton, 2011). The implicit message in dialogic classrooms is that one becomes knowledgeable by investing more effort, by thinking more, and by searching for different options and comparing their outcomes. Thus, children may learn not to shy away from intellectual challenges, to learn from their errors, and to persist when faced with failure—characteristics that have been associated with greater academic success.

Dialogic Learning in Practice: Why the Resistance?

This chapter has presented evidence that dialogic teaching is capable of enhancing learning to a

remarkable degree. We have also shown that dialogic teaching is now a major focus among scholars in the learning sciences. Despite the growing and increasingly convincing evidence for the power of dialogic instruction, however, not very much of it is going on in most schools. There are plenty of professional development offerings that claim to help teachers learn dialogic teaching skills, but most are shallow and not empirically tested. Many school textbooks contain suggested "discussion" topics as an extension of the "basic" instructional material they offer. But efforts to seriously adopt dialogic teaching as a core (and constant) instructional method are not common. And even when a school or district takes up a *plan* for increasing this kind of instruction, it is rarely fully implemented. Why is this the case?

Public and Professional Beliefs

One answer may lie in deeply held, shared beliefs about learning and intelligence that underlie almost every aspect of schooling. The public at large continues to believe that differences in inherited intelligence explain most differences in learning success. Many assume that only some people can think and reason at high levels, while the rest can only work toward acquiring a fixed body of knowledge. In addition, many teachers (as well as parents) believe that children must learn facts before they can engage in the kinds of conversations that build conceptual understanding. "My students don't know enough to have a meaningful conversation" is a frequent comment from teachers who first encounter dialogic teaching. If learning is understood as mastering the individual components of a task one by one, then "drill and practice"—the most common form of instruction worldwide—makes sense, especially in a field like math, where knowledge is relatively hierarchical. The view that knowledge consists of accumulating bits of information is supported by teacher training programs, school districts' "scope and sequence" documents, and assumptions about learning that are embedded in the curriculum and within tests.

It is also consonant with (although not *required* by) the still-dominant psychological theory of better learning through *direct instruction* (Kirschner, Sweller, & Clark, 2006).

This set of views supports the related belief that only some students—those already advantaged by race and social class—can benefit from dialogic teaching. Pauli and Reusser (2015); Klieme, Pauli, and Reusser (2009); and Pauli, Reusser, and Grob (2007) documented a systematic bias *against* using dialogic methods in classrooms in Switzerland and Germany—except for classrooms populated primarily by students at the top of the academic ladder within their school systems. The same bias against using these methods with "ordinary" or "weak" or "less intelligent" students is also present in other countries. Students themselves may hold the view that they don't "know enough" to engage in a deep classroom discussion. In a longitudinal study of talk in a biology classroom, Clarke (2015) found that students viewed discussion as a *display* of knowledge, rather than the site where knowledge is *created*. As a result, almost half the students she was studying remained mostly silent over a six-week observation period.

Teachers' Knowledge and Skills, and School Conditions

Frequently, willing teachers have tried and failed to create and sustain dialogic classrooms. These may have been failures to manage or maintain discussions, or instances where teachers gave up because they did not see immediate improvement in student outcomes.[3] These failures have not been systematically investigated, but we can propose a few explanations.

Orchestrating productive discussions requires a set of complex skills that develop through extended practice, coaching, and reflection—time that teachers are rarely given. Especially in math and science, some teachers lack the necessary content knowledge to guide their students

[3] A substantial body of research shows that the benefits of dialogic teaching are often delayed (e.g., Schwartz & Martin, 2004; Kapur, 2011, 2012; Howe, McWilliam, & Cross, 2005; Asterhan & Schwarz, 2007; Crowell & Kuhn, 2014).

through the kind of discussions that result when students are encouraged to wonder aloud and share their observations. Without sustained support from peers and supervisors, teachers are likely to regress to "safe" forms of classroom talk—such as teacher-led discussion in which students answer a sequence of questions that yields a shared correct answer to a complex question but does not engage them in cognitive struggle. In some cases, teachers and/or students are uncomfortable with argument in general, which may be associated with unpleasantness or disrespect. In others, teachers "water down" talk by focusing on social aspects of discussion such as how many students made contributions, instead of helping them to build an argument that makes a claim on truth.

Finally, testing plays an increasingly important role in schools, with two or even three rounds of diagnostic testing, weeks of state test administration, and months spent on test preparation. The focus on test scores crowds out other forms of instruction, and renders suspect anything considered to be innovation.

Next Steps

It should be clear from the proceeding section that we will not see widespread dialogic teaching without social, as well as intellectual, change. Teachers, students, parents, and scholars have all been socialized into practices that assume knowledge can be transmitted. These practices actively—although not intentionally—block attempts to build students' minds. Beyond new policies and pedagogies, we need a culture change in schools.

To move in this direction, we first recommend placing this work in the hands of groups of committed teachers. Technology now allows individual teachers to look outside of their districts for training, coaching, and other kinds of support. In the future, scholars and foundations may create new ways of collaborating and new interventions to help provide teachers with the other

elements they need to be successful: opportunities to try out new approaches, thoughtful feedback on their efforts to change their practice, and adequate time for reflection. Perhaps most importantly, teachers will need a sense of "professional safety" while they attempt profound changes in social engagement within their classrooms. There will need to be "safe spaces" as teachers try out, and further develop, new ways of teaching.

Scholars of learning and teaching must prepare themselves for new forms of interaction and partnership with educators. We will need to tell and re-tell the story behind the research evidence that makes dialogic teaching so promising. We will need to maintain our commitment to scientific standards of evidence, while simultaneously finding ways to describe and evaluate, and eventually perhaps spread, the difficult work that leading teachers are undertaking.

Current research tells a promising, and to many, a surprising story. The research shows that in certain dialogic classrooms, all kinds of students learned more than they were directly taught. We do not see these results in classrooms where drill and practice is the norm. And this is not just the latest version of "discovery education," which often turns out only to benefit already advantaged students. Dialogic teaching and learning, then, may be a game changer, offering the possibility of creating more intellectual competence among more individuals. In short, this is a story about human potential. It can no longer be ignored.

References

Adey, P., & Shayer, M. (1990). Accelerating the development of formal thinking in middle and high school students. *Journal of Research in Science Teaching*, *27*(3), 267-285.

Adey, P., & Shayer, M. (2015). The effects of Cognitive Acceleration. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 127-140). Washington, DC: American Educational Research Association.

Anderson, R. C, Chinn, C., Waggoner, M., & Nguyen, K. (1998). Intellectually stimulating story discussions. In J. Osborn & F. Lehr (Eds.), *Literacy for all: Issues in teaching and learning* (pp. 170-186). New York, NY: Guildford.

Anderson, R. C., Nguyen-Jahiel, K., McNurlen, B., Archodidou, A., Kim, S.-Y., Reznitskaya, A., & Gilbert, L. (2001). The snowball phenomenon: Spread of ways of talking and ways of thinking across groups of children. *Cognition and Instruction, 19*(1), 1-46.

Applebee, A. N., Langer, J. A., Nystrand, M. & Gamoran, A. (2003). Discussion-based approaches to developing understanding: Classroom instruction and student performance in middle and high school English. *American Educational Research Journal, 40*(3), 685-730.

Asterhan, C. S., & Schwarz, B. B. (2007). The effects of monological and dialogical argumentation on concept learning in evolutionary theory. *Journal of Educational Psychology, 99*(3), 626.

Beck, I. L., McKeown, M. G., Sandora, C., Kucan, L., & Worthy, J. (1996). Questioning the Author: A yearlong classroom implementation to engage students with text. *Elementary School Journal, 96*(4), 385-414.

Beck, I. L., & McKeown, M. G. (2006). *Improving comprehension with Questioning the Author: A fresh and expanded view of a powerful approach*. New York, NY: Scholastic, Inc.

Bill, V. L., Leer, M. N., Reams, L. E., & Resnick, L. B. (1992). From cupcakes to equations: The structure of discourse in a primary mathematics classroom. *Verbum, 1, 2*, 63-85.

Bitter, C., O'Day, J., Gubbins, P., & Socias, M. (2009). What works to improve student literacy achievement? An examination of instructional practices in a balanced literacy approach. *Journal of Education for Students Placed at Risk, 14*, 17-44.

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263.

Chapin, S., & O'Connor, C. (2012). Project Challenge: Using challenging curriculum and mathematical discourse to help all students learn. In C. Dudley-Marling & S. Michaels (Eds.), *High expectation curricula: Helping all students succeed with powerful learning* (pp. 113-127). New York, NY: Teachers College Press.

Chinn, C., & Anderson, R. (1998). The structure of discussions that promote reasoning. *Teachers College Record, 100*(2), 315-368.

Clarke, S. N. (2015). The right to speak. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 167-180). Washington, DC: American Educational Research Association.

Crowell, A., & Kuhn, D. (2014). Developing dialogic argumentation skills: A 3-year intervention study. *Journal of Cognition and Development, 15*(2), 363-381.

Dweck, C. (2006). *Mindset: The new psychology of success*. New York, NY: Random House LLC.

Education Endowment Foundation (2015). Philosophy for Children: Evaluation Report and Executive Summary. London, UK: Education Endowment Foundation.

Great Books Foundation (1987). *An introduction to shared inquiry*. Chicago, IL: The Great Books Foundation.

Greeno, J. G. (2015). Classroom talk sequences and learning. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 255-262). Washington, DC: American Educational Research Association.

Heath, S. B. (1991). “It’s about winning!” The language of knowledge in baseball. In L. Resnick, J. Levine, & S. Teasley (Eds.), *Perspectives on socially shared cognition*. Washington, DC: American Psychological Association.

Heath, C., & Luff, P. (1992). Collaboration and control: Crisis management and multimedia technology in London Underground line control rooms. *Journal of Computer-Supported Cooperative Work (CSCW)*, 7(1), 69–94.

Howe, C., McWilliam, D., & Cross, G. (2005). Chance favours only the prepared mind: Incubation and the delayed effects of peer collaboration. *British Journal of Psychology, 96*(1), 67-93.

Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.

Kapur, M. (2011). A further study of productive failure in mathematical problem solving: Unpacking the design components. *Instructional Science, 39*(4), 561-579.

Kapur, M. (2012). Productive failure in learning the concept of variance. *Instructional Science, 40*(4), 651-672.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential and inquiry-based teaching. *Educational Psychologist,* Vol. 41, 75-86.

Klieme, E., Pauli, C., & Reusser, K. (2009). The Pythagoras Study: Investigating effects of teaching and learning in Swiss and German mathematics classrooms. In T. Janik & T. Seidel (Eds.), *The power of video studies in investigating teaching and learning in the classroom* (pp. 137-160). Münster, Germany: Waxmann.

Koedinger, K. R., & Wiese, E. S. (2015). Accounting for socializing intelligence with the Knowledge-Learning-Instruction Framework. In L. Resnick, C. Asterhan, & S. Clarke

(Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 275-286). Washington, DC: American Educational Research Association.

Kuhn, D. (2005). *Education for thinking*. Cambridge, MA: Harvard University Press.

Kuhn, D., & Zillmer, N. (2015). Developing norms of discourse. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 77-86). Washington, DC: American Educational Research Association.

Langer, J. A. (2001). Beating the odds: Teaching middle and high school students to read and write well. *American Educational Research Journal, 38*(4), 837-880.

Lave, J., Murtaugh, M., & de la Rocha, O. (1984). The dialectic of arithmetic in grocery shopping. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context*. Cambridge, MA: Harvard University Press.

Lipman, M. (1981). Philosophy for children. In A. L. Costa (Ed.), *Developing minds: Programs for teaching thinking, Volume 2* (pp. 35–38). Alexandria, VA: Association for Supervision and Curricular Development.

Lipman, M. (2003). *Thinking in education* (2nd ed.). Cambridge, UK & New York, NY: Cambridge University Press.

McKeown, M. G., & Beck, I.L. (2015). Effective classroom talk *is* reading comprehension instruction. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 51-62). Washington, DC: American Educational Research Association.

Matsumura, L. C., & Garnier, H. E. (2015). Embedding dialogic teaching in the practice of a large school system. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 415-426). Washington, DC:

American Educational Research Association.

Mead, G. H. (1934). *Mind, self, and society*. Chicago, IL: The University of Chicago Press.

Michaels, S., O'Connor, C., & Resnick, L. B. (2008). Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life. *Studies in philosophy and education, 27*(4), 283-297.

Murphy, P. K., Wilkinson, I. A. G., Soter, A. O., Hennessey, M. N. & Alexander, J. F. (2009). Examining the effects of classroom discussion on students' high-level comprehension of text: A meta-analysis. *Journal of Educational Psychology, 101*, 740-764.

Nussbaum, E. M., & Asterhan, C. S. C. (2016). The psychology of far transfer from classroom argumentation. In F. Paglieri, L. Bonelli, & S. Felletti (Eds.), *The psychology of argument: cognitive approaches to argumentation and persuasion* (pp. 407-423). London: College Publications, Studies in Logic and Argumentation series.

O'Connor, C., Michaels, S., & Chapin, S. (2015). "Scaling down" to explore the role of talk in learning: From district intervention to controlled classroom study. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 111-126). Washington, DC: American Educational Research Association.

Pauli, C., Reusser, K., & Grob, U. (2007). Teaching for understanding and/or self-regulated learning? A video-based analysis of reform-oriented mathematics instruction in Switzerland. *International Journal of Educational Research, 46*(5), 294-305.

Pauli, C., & Reusser, K. (2015). Discursive cultures of learning in (everyday) mathematics teaching in German and Swiss classrooms. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 181-193). Washington, DC: American Educational Research Association.

Piaget. J., & Inhelder, B. (1969). *The psychology of the child*. London: Routledge.

Pontecorvo, C. & Fasulo, A. (1997). Learning to argue in family shared discourse. In L. B. Resnick, C. Pontecorvo, & R. Säljö (Eds.), *Discourse, tools, and reasoning: Essays on situated cognition*. Berlin, Germany: Springer Berlin-Heidelberg.

Resnick, L. B., Asterhan, C. S. C., & Clarke, S. N. (Eds.) (2015). *Socializing intelligence through academic talk and dialogue*. Washington, DC: American Educational Research Association.

Resnick, L. B., Bill, V. L., Lesgold, S. B., & Leer, M. N. (1991). Thinking in arithmetic class. In B. Means, C. Chelemer, & M.S. Knapp (Eds.), *Teaching advanced skills to at-risk students* (pp. 27-53). San Francisco, CA: Jossey-Bass.

Resnick, L. B., Michaels, S., & O'Connor, C. (2010). How (well structured) talk builds the mind. *Innovations in educational psychology: Perspectives on learning, teaching and human development* (pp. 163-194).

Reznitskaya, A., Anderson, R. C., Dong, T., Li, Y., Kim, I.-H., & Kim, S.-Y. (2008). Learning to think well: Application of argument schema theory to literacy instruction. In C. C. Block & S. R. Paris (Eds.), *Comprehension instruction: Research-based best practices* (2nd ed.) (pp. 196-213). New York: Guilford.

Schwartz, D. L., & Martin, T. (2004). Inventing to prepare for future learning: The hidden efficiency of encouraging original student production in statistics instruction. *Cognition and Instruction, 22*(2), 129-184.

Shayer, M. (1999). Cognitive acceleration through science education II: Its effects and scope. *International Journal of Science Education,* 21, (8), 883-902.

Suchman, L. 1997. Centers of coordination: A case and some themes. In Resnick, L. B.,

Pontecorvo, C., & Säljö, R. (Eds.), *Discourse, tools, and reasoning: Essays on situated cognition*. Berlin, Germany: Springer Berlin Heidelberg.

Sun, J., Anderson, R. C., Perry, M., & Lin, T.-J. (in press). Emergent leadership in children's cooperative problem solving groups. *Cognition and Instruction*.

Sun, J., Anderson, R. C., Lin, T-J., & Morris, J. (2015). Social and cognitive development during collaborative reasoning. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 63-75). Washington, DC: American Educational Research Association.

Taatgen, N. A. (2013). The nature and transfer of cognitive skills. *Psychological Review, 120*(3), 339-471.

Taylor, B. M., Pearson, P. D., Clark, K., & Walpole, S. (2000). Effective schools and accomplished teachers: Lessons about primary grade reading instruction in low-income schools. *Elementary School Journal, 101*, 121-165.

Topping, K. J., & Trickey, S. (2007a). Collaborative philosophical enquiry for school children: Cognitive effects at 10-12 years. *British Journal of Educational Psychology, 77*, 271–288.

Topping, K. J., & Trickey, S. (2007b). Collaborative philosophical enquiry for school children: Cognitive gains at two-year follow-up. *British Journal of Educational Psychology, 77*, 787-796.

Topping, K. J., & Trickey, S. (2015). The role of dialogue in Philosophy for Children. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 99-110). Washington, DC: American Educational Research

Association.

Wheelock, A. (2000). The Junior Great Books program: Reading for understanding in high-poverty urban elementary schools. A report prepared for the Junior Great Books Program. (ERIC No. ED441927).

Wilkinson, I. A. G., Murphy, P. K., & Binici, S. (2015). Dialogue-intensive pedagogies for promoting reading comprehension: What we know, what we need to know. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), *Socializing intelligence through academic talk and dialogue* (pp. 37-50). Washington, DC: American Educational Research Association.

Vygotsky, L. S. (1962). *Thought and language*. (E. Hanfmann & G. Vakar, Eds., Trans.). Cambridge, MA: MIT Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*(2), 267-301.