What REALLY Works: Optimizing Classroom Discussions to Promote Comprehension and Critical-Analytic Thinking

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Abstract

Many American students struggle to perform even basic comprehension of text, such as locating information, determining the main idea, or supporting details of a story. Even more students are inadequately prepared to complete more complex tasks, such as critically or analytically interpreting information in text or making reasoned decisions from reading. Although many reasons undergird students' comprehension challenges, evidence-based instructional approaches can promote students' comprehension and critical-analytic thinking. Teacher-facilitated, small-group discussions can promote students' comprehension and critical-analytic thinking about, around, and with both oral and written discourse.

Keywords

critical-analytic thinking, small-group discussion, text comprehension, policy recommendations

Tweet

Teacher-facilitated, small-group discussions can be optimized to promote students' comprehension and critical-analytic thinking about text.

Key Points

- Text-based, small-group discussions can promote students' comprehension and critical-analytic thinking.
- The optimal instructional frame before, during, and after discussions, can improve students' learning outcomes.
- Enhancing critical-analytic thinking through small-group discussion requires the gradual release of responsibility from teacher to students.
- Students can gain interpretive authority through evidence-based thinking and reasoning.

- Characteristics of the learner, group, and text influence both the nature of the discussion and individual learner outcomes.
- Initial and ongoing support through professional development is required for successfully implementing small-group discussion.

> *To think incisively and to think for one's self is very difficult. .... Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction. The function of education, therefore, is to teach one to think intensively and to think critically.*
>
> Martin Luther King, Jr. (1947, p. 10)

From the passing of governmental legislation like the Civil Rights Act (1964) in response to unbridled civil outcries, to individual medical decisions rooted in doctors' advice and Internet medical sources, to teachers' implementation of particular pedagogies based on journal articles about "what works in classrooms," the ways we live are guided by our ability to read, comprehend, and make reasoned decisions from oral and written discourse. As suggested by Dr. King (1947) during his days as a student at Morehouse College, the cognitive ability to "sift and weigh evidence" or make incisive decisions are not skills that birth endows, but rather education must produce such abilities (p. 10). Certainly, education can be formal, as in public schools across the country, or it could be informal and take different forms (e.g., interactions with caregivers or life experiences). Unfortunately, nation-wide assessments like the National Assessment of Educational Progress (NAEP, 2015) show that whatever form such *education* is taking, it is failing to adequately equip our nation's youth with the skills requisite for thinking in critical or analytic ways.

As a case in point, the most recent results from NAEP (2015) indicate that a staggering 31% of American 4th-grade students cannot locate relevant information or provide details to support an interpretation of what they have read. In essence, such students lack even basic comprehension skills. Only 36% of participating 4th-grade students exhibited critical-analytic thinking through text integration and interpretation or by using their understandings to make

evaluative judgments or draw conclusions. Not surprisingly, similar trends appeared for 8th-grade students, and skill deficits were exacerbated by factors such as ethnic identification, poverty status, school type, or gender. By 12th grade, 25% of tested students were still unable to perform these same rudimentary comprehension activities. If, as Dr. King (1947) avers, education's goal is to foster critical-analytic thinking, then everyday educational practice will need to be modified.

Of course, these issues are not new, and countless debates have considered how best to improve students' skills, particularly their ability to think and reason about, around, and with oral and written discourse. Students need to be able to weigh evidence gleaned from text and to make reasoned decisions across subject matters (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). As we see it, the challenge is not that educational stakeholders are indifferent to the aforementioned skill deficits. Rather, the solution paths to alleviate these deficits are varied, and what will prove effective in a given context is difficult to ascertain (Institute of Education Sciences, n.d.). Most educational stakeholders believe wholly knowledge-driven, how-to instructions (i.e., *efferent approach*) to content and assessment will resolve the problem. Such an approach has generated an influx of informational text exposure, saturation at a very young age, and a buffet of assessments. As Rosenblatt (1978) astutely suggested, such an approach ignores the readers' natural inclination to be drawn to literature as a lived-through experience (i.e., *expressive approach*). We propose that the solution lies not in either an efferent or an expressive approach to text and other content, but in pedagogical approaches such as small-group, classroom discussions that value knowledge-seeking, in concert with lived-through experience, to promote critical-analytic thinking (Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009).

Specifically, reviewing the theoretical and empirical literature pertaining to classroom discussion (Murphy et al., 2009) and critical thinking (Abrami, Bernard, Borokhovski, Waddington, Wade, & Persson, 2015), we contend that small-group, text-based discussion can promote critical-analytic thinking. As Murphy and colleagues (2009) suggested in their review of text-based discussion approaches, such discussions specifically aim at supporting critical-analytic thinking. A particular instructional frame fosters productive discussions that increase comprehension and critical-analytic thinking (e.g., students asking authentic questions and teachers facilitating the discussion; Abrami et al., 2015; Murphy et al., 2009). Further, characteristics of the learner and the text mediate the resulting gains in students' learning and thinking. Finally, promoting critical-analytic thinking through discourse requires a more knowledgeable other (Abrami et al., 2015). In classrooms, the more knowledgeable other is the teacher, but unfortunately, many teachers lack instructional strategies that effectively advance students' thinking through discourse. As such, teachers need professional development providing opportunities to learn about the powerful pedagogical role of talk in classrooms, as well as to foster their ability to guide the daunting trek toward critical-analytic thinking.

Optimizing Classroom Discussions through Instructional Framing

Recent meta-analytic findings revealed that not all discussions approaches generate productive talk (i.e., talk associated with high-level comprehension and critical-analytic thinking outcomes; Murphy et al., 2009). Indeed, what teachers and students do before, during, and after the discussion, in terms of instructional framing, necessarily influences the discussion and its effect on students' critical-analytic thinking. Next, we review specific aspects of each phase of classroom discussion (i.e., before, during, and after) that can enhance students' comprehension and critical-analytic thinking.

Before the Discussion: Priming

Basic comprehension is a prerequisite for developing students' critical and analytic thinking about, around, and with text (Kintsch, 1988; van Dijk & Kintsch, 1983). Thus, students must possess a basic understanding of the text prior to participating in a discussion. Yet, simply possessing this basic understanding is not sufficient; students' understanding of the text must be primed, so they have adequate cognitive access to their prior knowledge and can make meaningful connections with incoming information during the discussion (McNamara & Kintsch, 1996). Knowledge priming can be fostered through pre-discussion activities that trigger students' personal (Linden & Wittrock, 1981) or cultural experiences (Reynolds, Taylor, Steffensen, Shirey, & Anderson, 1982), knowledge of the domain or topic (Yekovich, Walker, Ogle, & Thompson, 1990), or even their understanding of the structure of a text (Meyer & Freedle, 1984).

Text-based discussion research has shown that having students generate their own questions prior to the discussion also serves to prime their knowledge. Indeed, students' ability to generate authentic questions about, around, and with the text ties to both comprehension and critical-analytic thinking (Murphy et al., 2009; Nystrand & Gamoran, 1991). Unfortunately, many students are wise in the ways of schooling and are more familiar with traditional forms of question and answering—questions that require low-level recall and basic comprehension of the text (Kintsch, 1988; Sinclair & Coulthard, 1975). As a result, students require explicit instruction and guided practice in generating question types (e.g., generalization or analysis) that are more likely to elicit high-level comprehension. Students also require instruction and practice in generating evidence-based, elaborated responses (i.e., argumentation; Soter et al., 2008). Opportunities to practice and prepare questions and to practice argumentation *before* the

discussion together set the stage for productive discussions (Mercer, Dawes, Wegerif, & Sams, 2004; RAND Reading Study Group Report, 2002; Rosenshine, Meister, & Chapman, 1996).

In pre-discussion activities, teachers better position their students to benefit from small-group discussions that promote critical-analytic thinking. Yet, in order to fully harness talk as a tool for thinking, teachers and students must reconceptualize their traditional classroom roles *during* the discussion, which is most productive when teachers and students share control.

During the Discussion: Promoting Meaningful Interactions

Teacher scaffolding moves (e.g., challenging students' response) influence students' talking and thinking in small-group, teacher-led discussions (Abrami et al., 2015). A plausible explanation for this effect is that during productive discussions, the teacher serves as a "more capable" other, providing support to develop students' critical and analytic thinking (Vygotsky, 1978, p. 86). For example, when teachers query students' explanatory frame (e.g., seeking clarification or evidence), then students are more likely to construct ideas during the discussion (e.g., Jadallah et al., 2011; Lin et al., 2015). Further, these intensive forms of teacher scaffolding moves serve to establish norms for students' thinking within the discussion (Nystrand, 1997). Teachers' use of scaffolding moves in discussions gives way to students spontaneously employing such moves later in the discussion, prompting other students for evidence, praising others' use of evidence, and requesting clarification from others (Jadallah et al., 2011). Undoubtedly, without the teacher's initial scaffolding during the discussion, students would have missed these opportunities to clarify their understanding, make inferences (Lin et al., 2015), or "critically extend each other's contributions" (Jadallah et al., 2011, p. 221).

Despite the importance of teacher's scaffolding moves, teachers must share with their students the control of discussion and interpretive authority of the text. In essence, productive

discussion requires that teachers gradually release their control and authority so students can take more responsibility to enhance their thinking (Cohen, 1994; Pearson & Gallager, 1983). This gradual release most often manifests during the discussion as decreased teacher talk and concomitantly increased student talk (e.g., Murphy et al., 2009).

As teachers gradually release control, students are expected to take on increasing responsibility and to co-construct understandings of the text, a process referred to as *interthinking* (Mercer, 2000, p. 141). Specifically, students take on interpretative authority and turn-taking control during the discussion to create open participation. Sustained and open discussions that treat students as sources of knowledge more effectively stimulate their thinking, while promoting the spread of thinking among students (Anderson et al., 2001; Nystrand, 1997). When students raise questions that genuinely interested them (e.g., speculative or high-level thinking) and actively construct elaborated explanations in response to those questions, they are more likely to develop critical and analytic thinking (Nystrand, Wu, Gamoran, Zeiser, & Long, 2003; Soter et al., 2008; Webb, 1989). As a case in point (Chinn, O'Donnell, & Jinks, 2000), students who gave elaborated explanations that were supported with evidence learned relatively more content than those whose responses were not elaborated during the discussion. Further, when students take on interpretative authority during the discussion, they begin to address their questions and respond directly to group members, instead of referring to the teacher as the ultimate source (Anderson, Chinn, Chang, Waggoner, & Nguyen, 1998).

While teachers and students take on different roles during the discussion, they both harness talk as a tool to externalize their cognitive processes: Teachers employ discourse moves, such as modeling, to scaffold students' thinking, and students negotiate with each other to co-construct meaning. In essence, students' discourse becomes an external indicator of their

thinking (Chinn, Anderson, & Waggoner, 2001; Vygotsky, 1978). For instance, students' generation of elaborated explanations (Chinn et al., 2000; Webb, 1989), along with instances of exploratory talk (Mercer, 1995, 2000), are both external indicators of students' internal cognitive processing—processing shown to predict high-level comprehension and critical-analytic thinking (Soter et al., 2008). Teachers can learn to use their understanding of student talk (externalized cognitive processing) as a mechanism to gauge students' understanding *in situ*. In essence, the on-going discussion allows teachers to assess students' cognitive processing of the text and content, as well as to provide appropriate feedback through teacher scaffolding moves, to enhance students' understandings (Hattie & Timperley, 2007).

After the Discussion: Feedback and Transfer

While teachers can fine-tune the discussion and students' understandings in real time, the conclusion of the discussion can also be a time for summative feedback regarding their discourse practices and understandings about, around, and with the text (McAlpine, 2004). When teachers deliver summative feedback immediately following the discussion, students have more opportunities for growth (Dihoff, Brosvic, Epstein, & Cook, 2003; Epstein, Epstein, & Brosvic, 2001), while simultaneously eliminating misconceptions and diminishing unproductive talk in future discussions (Chickering & Gamson, 1987).

Similarly positive effects on student learning have resulted from task-relevant goal setting (e.g., Pintrich, 1995; Schunk 1991). In conducting productive discussions, setting specific learning goals (e.g., to challenge discussion group peers with evidence or to ask more inter-textual questions) can draw students' attention to these challenging but attainable aspects of the discussion. Such goals should pertain to the nature, as well as the content of the discussion,

because the primary reason to take part in the discussion is to enhance students' understandings of the text or content (Murphy et al., 2009).

Post-discussion activities can also support the transfer of small-group discussion skills and abilities beyond the scope of oral discourse to other content areas or tasks (Chesser, Gellalty, & Hale, 1997). Transfer from oral to written discourse (e.g., Kim, Anderson, Miller, Jeong, & Swim, 2011) is enhanced with minimal additional instruction or supports (Firetto, Murphy, Greene, Li, & Wei, 2015). When combined, these pre-, during, and post-discussion activities increase the likelihood of productive discussions. Our own intervention research, using a discussion approach we call *Quality Talk* (Murphy, Greene, & Firetto, 2015), finds that the aforementioned activities show gains in students' critical, reflective thinking about, around, and with text and content, as evidenced in oral and written discourse, fluency, and comprehension.

Dynamic Interactions in Productive Discussions: Learner, Group, and Text

Within all classroom discussions are factors that influence both the quality of the discussion, as well as students' learning outcomes. Characteristics of the learner, the group, and the text dynamically interact during a given discussion, and consequently all can affect the discussion's productivity. Next, we review characteristics of the learner (i.e., ability and gender), group (i.e., size and composition), and text (i.e., genre, structure, and topic) that influence classroom discussions and critical-analytic thinking.

Learner

No two students are the same. Rather, each learner possesses a unique set of characteristics, such as academic ability and gender. No doubt, students can be characterized by other diverse characteristics and experience, but ability and gender affect small-group discussions and learning outcomes (Webb & Palincsar, 1996; Wu, Anderson, Nguyen-Jahiel, &

Miller, 2013). A review of 19 empirical studies (Webb, 1989) examined students' learning in mathematics and computer science during peer-led, small-group interactions, and found a positive trend between students' elaborated explanations and individual achievement outcomes (e.g., Peterson & Swing, 1985; Webb, 1980). Learners with high academic abilities offered more elaborated responses, when other group members asked for help, and tended to achieve higher posttest scores (Webb & Kenderski, 1984). In a meta-analysis (Murphy et al., 2009), learners with low academic abilities seemed to benefit most from the identified discussion approaches (e.g., Instructional Conversation). Similarly, a recent study with fourth- and fifth-grade learners linked low academic ability to perceiving value of participating in discussions (Wu et al., 2013).

Gender disparities also emerge in students' discussion participation and learning achievement. A meta-analytic study that investigated gender differences in children's speech in classroom interactions showed that female students were generally more talkative than male students (Leaper & Smith, 2004). In addition to simply speaking more, the type of talk and motivation behind the talk also differed by gender. For example, girls reported greater motivation and engagement than boys in small-group discussions (Wu et al., 2013). Further, female students were more likely to use affiliative speech to support or elaborate on other's utterances, whereas male students tended to use more assertive speech to establish power and challenge other's perspectives. Similarly, female students produced more elaborated answers in response to peers' questions, compared to male students, in small-group cooperative learning activities (Webb, 1984). Nevertheless, female students' questions were more often ignored and less likely to receive elaborated responses from other group members than those of male students (Webb & Kenderski, 1985). This may be because male students asked more questions pertaining to specific parts of the problem, allowing more opportunities for elaborations, whereas female

students asked broader questions that were generally more difficult to answer. In sum, the diversity of individual ability and gender influences both students' discussion engagement and their subsequent learning outcomes, including critical-analytic thinking.

Group

Given the influence of various individual factors on students' learning outcomes, considering characteristics of the group (i.e., size and composition) will fully optimize discussions to promote comprehension and critical-analytic thinking. In Abrami et al.'s (2015) meta-analysis, teacher-facilitated discussions conducted in both small-group and whole-class formats were effective at promoting critical-analytic thinking, compared to control groups. However, small-group discussion had an empirical advantage over whole-class discussion (Murphy et al., 2009).

A plausible explanation for the superior effects of small-group discussions may stem from argument strategies being more likely assimilated by peers in small-group discussions, as compared to whole-class discussions (Anderson et al., 2001). Further, small-group discussions led by peers fostered greater text engagement (Wu et al., 2013), better learning outcomes (Anderson et al., 2001; Murphy et al., 2009), and improved social skills (Webb & Palincsar, 1996). Small-group discussions may particularly support critical-analytic thinking (Murphy & Mason, 2006): Students in small-group discussions revised their knowledge and beliefs, if peers provided convincing alternative perspectives during argumentative exchanges. In sum, while discussions in general promote students' critical-analytic thinking, small-group discussions may be the optimal format.

Despite an advantage for small-group discussions over whole-group discussions, the empirical evidence regarding the specific composition (e.g., heterogeneous ability or

homogeneous ability) of the small-group discussions is mixed. Individual ability levels may mediate the effect of grouping arrangement on students' learning outcomes (Saleh, Lazonder, & de Jong, 2005; Webb & Palincsar, 1996); heterogeneous grouping benefits low-ability students most, as they have a greater opportunity to learn from more competent peers (Vygotsky, 1978). Alternatively, average-ability students were overlooked more in heterogeneous groups, while high-ability students showed equally strong achievement in both grouping forms (Saleh et al., 2005). In order to boost average-ability students' participation in heterogeneous group discussions, ground rules (e.g., turn-taking mechanism) and discussion goals (e.g., being a help-provider or help-seeker) are effective (Saleh, Lazonder, & de Jong, 2007). Another study randomly assigned students based on oral reading fluency to either homogeneous- or heterogeneous-ability small-group discussions, but without advantage for either grouping type on reading comprehension or writing outcomes (Murphy et al., 2015). While findings regarding the ideal grouping composition are mixed, incorporating certain features into the discussion, such as establishing ground rules and setting explicit goals, may facilitate learning for students of all ability levels and contribute to critical-analytic thinking.

Text

The dynamic interactions in the small-group discussions all have text as their central focus (i.e., text-based discussions). Based on the extant reading comprehension literature, it seems intuitive that factors like genre (e.g., narrative, expository, and mixed; Alexander & Jetton, 2000), structure (e.g., story structure, comparison, causation, and problem-and-solution; Meyer, 1975), and topic would play roles in productive discussions and learner outcomes. Unfortunately, research in this area is only now emerging.

Due, perhaps, to the prevalent use of fictional stories in primary grades (Duke, 2000), few studies have examined the impact of text genre on discussion quality and learning outcomes. One such study found that elementary school students more engaged in the discussion when discussing mixed genre texts (e.g., biographical text), but assessed no achievement outcomes (Leal, 1992). Students did evidence greater high-level thinking and comprehension, when discussing narrative texts than when discussing expository texts in small groups (Li, Murphy, & Firetto, 2014). Further, in terms of text structure, students generated significantly more authentic questions during discussions of texts with comparison structure than for other text structures (e.g., sequence or description). However, the effect of topic familiarity was not controlled. Therefore, text topic or topic interestingness may have also affected the discussions and resulting learning outcomes. Our research team is currently pursuing this line of research (e.g., Murphy et al., 2015). What we do know is that, regardless of the genre, structure, or topic, the texts selected for discussion should be about topics of interest to students, provide a rich context for students to integrate information, and leave some epistemological space that allows multiple interpretations and critical-analytic thinking (Wilkinson, Soter, & Murphy, 2010).

Discourse Innovation through Partnerships and Professional Development

Despite what is known about optimizing discourse practices and the nature of the dynamic interactions that affect learning outcomes, successful implementation in classrooms requires buy-in from a host of educational stakeholders, including district administrators, building principals, teachers, students, and caregivers, as well as a multitude of resources. Our experiences as intervention researchers suggest that such buy-in and resources are not easily obtained nor retained (Murphy, 2015). Anecdotally, educators are commonly approached by eager researchers who are interested in *trying-out* their idea with seemingly little knowledge of

the ecology or needs of the school. Moreover (Murphy, 2015), even with mutual need and ample resources, school/practitioner-researcher partnerships must be cultivated and consistently nurtured. Unfortunately, evidence-based practices in developing such partnerships or in teacher professional development often depend on self-report data (vulnerable to bias), or worse, not well-documented empirically.

Notwithstanding the dearth of literature regarding such partnerships, some general ideas are present in the literature. Specifically, researchers must recognize and embrace the wealth of knowledge that teachers contribute to any partnership, in terms of the culture and ecology of their classroom, students, and content; that is, teachers contribute a sense of *place* (Ebershön, 2015). Researchers need to establish trust when partnering with educators, as implementing any new intervention requires altering current practices—practices that in most cases the teacher believed already "worked" (Murphy, 2015). Moreover, as with any partnership, mutual devotion of time and ample resources must support the researchers, teachers, and students taking part (Murphy, 2015).

A key way that teachers and researchers invest time is through initial and ongoing professional development (Elmore & Burney, 1997). Unfortunately, professional development workshops are not necessarily sufficient for teachers to understand, embrace, and incorporate pedagogical principles and critical components of effective small-group discussions into their classrooms. An emerging literature identifies trends across successful professional development workshops (e.g., McKeown, FitzPatrick, & Sandmel, 2014). For example (Garet, Porter, Desimone, Birman, & Yoon, 2001), a large-scale, national comparison found that self-reports of changes in teachers' behaviors are most associated with professional development workshops that: (a) are both "intensive" and "sustained" (p. 935); (b) focus on specific content, rather than

general principles; (c) provide an opportunity for teachers to engage in active learning as part of the professional development; and, (d) align with pertinent district-adopted standards and agendas. In addition (Desimone, Porter, Garet, Yoon, & Birman, 2002), reform-type professional development workshops (e.g., interventions) tend to be more effective than traditional forms (e.g., district-initiated workshops or college-credit workshops), so teachers should participate in professional development with other teachers from their school or grade to encourage "collective participation" (p. 86).

Clearly, the traditional notion of a *one-shot* professional development workshop is nearly universally rebuked (Kennedy, 1998). Effective professional development must have some ongoing support following the initial workshop. This ongoing support can be discourse coaching, in which teachers learn to code their own classroom discussions, as a mechanism to enhance discussion facilitation (Murphy et al., 2015). However, the empirical research on the effectiveness of coaching is mixed (Stanulis, Little, & Wibbens, 2012). These mixed findings may be due to variations in coaches' experiences and qualifications, teachers' amount of coaching, and the coaching activities (Matsumura et al., 2012). Importantly, quality coaching, in conjunction with professional development, can increase success, compared to the same professional development without coaching (Sailors & Price, 2010). In the best-case scenario, ample time and resources would be available for researchers to build partnerships with schools, provide initial and ongoing support for teachers, as they work to enhance their discourse practices, and ultimately the critical-analytic thinking of their students.

Coda

Preparing students to think intensively and to make evidence-based, incisive decisions is a daunting, but not impossible, goal. Indeed, fostering such abilities in students will require that

educators refocus their efforts toward facilitating students' comprehension and critical-analytic thinking, rather than the rote learning of information. What we know *really works* in promoting this type of learning is small-group, text-based discussions. Indeed, teacher-facilitated, small-group discussions should be optimized to promote students' critical-analytic thinking. Policy suggestions for educational stakeholders, including federal and state officials, are requisites for achieving this ambitious goal.

1. **The espoused curricular goals of education must align with the standardized assessments used to measure progress toward those goals.** If the goal of education is to foster students' ability to read, comprehend, and make reasoned decision from oral and written discourse, then the established assessments must reliably and validly measure those same abilities (i.e., critical-analytic thinking).
2. **Teachers must have sufficient latitude and resources to support changes in their pedagogical practices.** A current practice is for educational policy makers to mandate every step in the educational process, from preservice teacher preparation to grade-level curriculum and pedagogy. Not only does this type of approach fail to recognize teachers' knowledge of their *place* and content, but it also fails to support adherence. Teachers need a voice in the process of educating their students, as well as support in incorporating interventions that *really do work* to promote critical-analytic thinking.
3. **Funding empirical research that enhances students' critical-analytic thinking is critical.** As in many areas of education, much more research is needed to respond to the calls for enhanced comprehension and critical-analytic thinking. Indeed, much more extensive, longitudinal investigations can further optimize and scale-up the use of small-group discussions in classrooms, particularly with an eye to the effects of moderating

variables, like the nature of the text. Additional empirical research on the effective characteristics of successful professional development is vital, if these initiatives are going to alter the educational landscape. Authentic classroom research requires resources (e.g., time and money). Without deliberate investment, enhancing students' critical-analytic thinking will remain a distant educational goal.

References

Abrami, P., Bernard, R., Borokhovski, E., Waddington, D., Wade, C., & Persson, T. (2015). Strategies for teaching Students to think critically: A meta-analysis. *Review of Educational Research, 85*(2), 275–314.

Alexander, P. A., & Jetton, T. L. (2000). Learning from text: A multidimensional and developmental perspective. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 285–310). Mahwah, NJ: Lawrence Erlbaum Associates.

Anderson, R. C., Chinn, C., Chang, J., Waggoner, J., & Nguyen, K. (1998). Intellectually stimulating story discussions. In F. Osborn (Ed.), *Literacy for all: Issues in teaching and learning* (pp. 170–186). New York: The Guilford Press.

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

Chesser, W. D., Gellalty, G. B., & Hale, M. S. (1997). Do Paideia Seminars explain higher writing scores? *Middle School Journal, 29,* 40–44.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*(7), 3–7.

Chinn, C. A., Anderson, R. C., & Waggoner, M. A. (2001). Patterns of discourse in two kinds of literature discussion. *Reading Research Quarterly, 36,* 378–411.

Chinn, C. A., O'Donnell, A. M., & Jinks, T. S. (2000). The structure of discourse in collaborative learning. *Journal of Experimental Education, 69,* 77–97.

Civil Rights Act of 1964, Pub.L. 88–352, 78 Stat. 241 (1964).

Cohen, E. G. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research, 64*(1), 1–35.

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, *24*(2), 81–112. doi:10.3102/01623737024002081

Dihoff, R. E., Brosvic, G. M., Epstein, M. L., & Cook, M. J. (2003). The role of feedback during academic testing: The delay retention test revisited. *The Psychological Record*, *53*(4), 533–548.

Duke, N. K. (2000). 3.6 minutes per day: The scarcity of informational texts in first grade. *Reading Research Quarterly, 35*(2), 202–224.

Ebersöhn, L. (2015). Making sense of place in school-based intervention research. *Contemporary Educational Psychology, 40,* 121–130.

Elmore, R., & Burney, D. (1997). *Investing in Teacher Learning: Staff Development and Instructional Improvement in Community School District# 2, New York City.* Retrieved from http://files.eric.ed.gov/fulltext/ED416203.pdf

Epstein, M. L., Epstein, B. B., & Brosvic, G. M. (2001). Immediate feedback during academic testing. *Psychological Reports, 88*(3), 889–894.

Firetto, C. M., Murphy, P. K., Greene, J. A., Li, M., & Wei, L. (2015, August). *Enhancing students' written argumentation through Quality Talk.* Paper presented at the biennial meeting of the European Association for Research on Learning and Instruction, Limassol, Cyprus.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, *38*(4), 915–945.

Hattie, J., & Temperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81–112.

Institute of Education Sciences. (n.d.). What works clearinghouse. Retrieved from http://ies.ed.gov/ncee/wwc/default.aspx

Jadallah, M., Anderson, R. C., Nguyen-Jahiel, K., Miller, B., Kim, I.-H., Kuo, L., . . . Wu, X. (2011). Influence of a teacher's scaffolding moves during child-led small-group discussions. *American Educational Research Journal, 48,* 194–230.

Kennedy, M. (1998). *Form and substance in inservice teacher education* (Research Monograph No. 13). Retrieved from http://files.eric.ed.gov/fulltext/ED472719.pdf

Kim, I.-H., Anderson, R. C., Miller, B., Jeong, J., & Swim, T. (2011). Influence of cultural norms and collaborative discussions on children's reflective essays. *Discourse Processes, 48(7)*, 501–528.

Kintsch, W. (1988). The role of knowledge in discourse comprehension: A construction-integration model. *Psychological Review, 95*(2), 163–182. doi:10.1037/0033-295X.95.2.163

Leal, D. (1992). The nature of talk about three types of text during peer group discussions. *Journal of Reading Behavior, 24*(3), 313–338.

Leaper, C., & Smith, T. E. (2004). A meta-analytic review of gender variations in children's talk: Talkativeness, affiliative speech, and assertive speech. *Developmental Psychology, 40*, 993-1027.

Li, M., Murphy, P. K., & Firetto, C. M. (2014). Examining the effects of text genre and structure on 4th- and 5th-grade students' high-level comprehension as evidenced in small group discussions. *International Journal of Educational Psychology, 3*(3)*,* 205–234.

Lin, T. J., Jadallah, M., Anderson, R. C., Baker, A. R., Nguyen-Jahiel, K., Kim, I.-H., … Wu, X. (2015). Less is more: Teachers' influence during peer collaboration. *Journal of Educational Psychology, 107*(2), 609–629.

Linden, M., & Wittrock, M. C. (1981). The teaching of reading comprehension according to the model of generative learning. *Reading Research Quarterly, 17*(1), 44–57.

King, Martin Luther, Jr. (Jan./Feb. 1947). The purpose of education. *The Maroon Tiger*, p. 10.

Matsumura, L. C., Garnier, H. E., & Spybrook, J. (2012). The effect of content-focused coaching on the quality of classroom text discussions. *Journal of Teacher Education*, *63*(3), 214–228. doi:10.1177/0022487111434985

McAlpine, L. (2004). Designing learning as well as teaching. A research-based model for instruction that emphasizes learner practice. *Learning in Higher Education, 5,* 119–134.

McKeown, D., FitzPatrick, E., & Sandmel, K. (2014). SRSD in practice: Creating a professional development experience for teachers to meet the writing needs of students with EBD. *Behavioral Disorders, 40*(1), 15-25.

McNamara, D., & Kintsch, W. (1996). Learning from texts: Effects of prior knowledge and text coherence. *Discourse Processes, 22*(3), 247–288.

Mercer, N. (1995). *The guided construction of knowledge: Talk amongst teachers and learners.* Philadelphia: Multilingual Matters.

Mercer, N. (2000). *Words and minds: How we use language to think together.* London: Routledge.

Mercer, N., Dawes, L., Wegerif, R., & Sams, C. (2004). Reasoning as a scientist: Ways of helping children to use language to learn science. *British Educational Research Journal*, *30*(3), 359–378.

Meyer, B. J. F. (1975). *The organization of prose and its effects on memory*. Amsterdam: North-Holland.

Meyer, B. J. F., & Freedle, R. O. (1984). Effects of discourse type on recall. *American Educational Research Journal*, *21*, 121–143.

Murphy, P. K. (2015). Marking the way: School-based interventions that "work." *Contemporary Educational Psychology, 40,* 1–4.

Murphy, P. K., Greene, J. A., & Firetto, C. M. (2015). *Quality Talk: Developing students' discourse to promote critical-analytic thinking, epistemic cognition, and high-level comprehension.* (Technical Report No. 2). The Pennsylvania State University.

Murphy, P. K., & Mason, L. (2006). Changing knowledge and changing beliefs. In P. A. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 305–326). Mahwah, NJ: Lawrence Erlbaum.

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.

National Center for Education Statistics. (2015). *The nation's report card: 2015 reading state snapshot report* (nation). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://nces.ed.gov/nationsreportcard/subject/publications/stt2015/pdf/2016008NP4.pdf

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for English language arts and literacy in history/social studies, science, and technical subjects*. Washington, DC: Authors.

Nystrand, M., & Gamoran, A. (1991). Instructional discourse, student engagement, and literature achievement. *Research in the Teaching of English*, *25*, 261–290.

Nystrand, M. (with Gamoran, A., Kachur, R., & Prendergast, C.). (1997). *Opening dialogue: Understanding the dynamics of language and learning in the English classroom.* New York: Teachers College Press.

Nystrand, M., Wu, L., Gamoran, A., Zeiser, S., & Long, D. (2003). Questions in time: Investigating the structure and dynamics of unfolding classroom discourse. *Discourse Processes, 35*(2), 135–198.

RAND Reading Study Group. (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. Santa Monica, CA: RAND.

Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology, 8*, 20–22.

Peterson. P. L., & Swing, S. R. (1985). Students' cognitions as mediators of the effectiveness of small-group learning. *Journal of Educational Psychology, 77*, 299–312.

Pintrich, P. (1995). Understanding self-regulated learning. *New Directions for Teaching and Learning, 63,* 3–12.

Reynolds, R. E., Taylor, M. A., Steffensen, M. S., Shirey, L. L., & Anderson, R. C. (1982). Cultural schemata and reading comprehension. *Reading Research Quarterly*, *17,* 353–366.

Rosenblatt, L. M. (1978). *The reader, the text, the poem: The transactional theory of the literary work.* Carbondale, IL: Southern Illinois University Press.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research*, *66*(2), 181–221.

Sailors, M., & Price, L, R. (2010). Professional development that supports the teaching of cognitive reading strategy instruction. *Elementary School Journal, 110*(3), 301–322.

Saleh, M., Lazonder, A. W., & de Jong, T. (2005). Effects of within-class ability grouping on social interaction, achievement, and motivation. *Instructional Science, 22*, 105–119.

Saleh, M., Lazonder, A. W., & de Jong, T. (2007). Structuring collaboration in mixed-ability groups to promote verbal interaction, learning and motivation of average-ability students. *Contemporary Educational Psychology, 32*(3), 314–331.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist, 26,* 207–231.

Sinclair, J. M., & Coulthard, M. (1975). *Towards an analysis of discourse: The English used by teachers and pupils.* Oxford: Oxford University Press.

Soter, A. O., Wilkinson, I. A. G., Murphy, P. K., Rudge, L., Reninger, K., & Edwards, M. (2008). What the discourse tells us: Talk and indicators of high-level comprehension. *International Journal Educational Research*, *47,* 372–391.

Stanulis, R. N., Little, S., & Wibbens, E. (2012). Intensive mentoring that contributes to change in beginning elementary teachers' learning to lead classroom discussions. *Teaching and Teacher Education*, *28,* 32-43.

van Dijk, T. A., & Kintsch, W. (1983). *Strategies of discourse comprehension*. San Diego, CA: Academic Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher mental psychological processes.* Cambridge, MA: Harvard University Press.

Webb. N. M. (1980). An analysis of group interaction and mathematical errors in heterogeneous ability groups. *British Journal of Educational Psychology, 50*, 266–276.

Webb, N. M. (1984). Microcomputer learning in small groups: Cognitive requirements and group processes. *Journal of Educational Psychology, 76*, 1076–1088.

Webb, N. M. (1989). Peer interaction and learning in small groups. *International Journal of Educational Research, 13*, 21–39.

Webb, N. M., & Kenderski. C. M. (1984). Student interaction and learning in small group and whole class settings. In P. L. Peterson, L. C. Wilkinson, & M. Hallinan (Eds.), *The social context of instruction: Group organization and group processes* (pp. 153-170). New York: Academic Press.

Webb, N. M., & Kenderski, C. M. (1985). Gender differences in small group interaction and achievement in high-achieving and low-achieving classrooms. In L. C. Wilkinson & C.

B. Marrett (Eds.), *Gender related differences in classroom interaction* (pp. 209–226). New York: Academic Press.

Webb, N. M., & Palinscar, A. S. (1996). Group processes in the classroom. In D. Berliner & R. Calfee (Eds.), *Handbook of educational psychology* (pp. 841–873). New York: Macmillan.

Wilkinson, I. A. G., Soter, A. O., & Murphy, P. K. (2010). Developing a model of Quality Talk about literary text. In M. G. McKeown & L. Kucan (Eds.), *Bringing reading research to life* (pp. 142–169). NY: Guilford Press.

Wu, X., Anderson, R. C., Nguyen-Jahiel, K., & Miller, B. (2013). Enhancing motivation and engagement through collaborative discussion. *Journal of Educational Psychology, 105*(3), 622–632.

Yekovich, F., Walker, C., Ogle, L., & Thompson, M. (1990). The influence of domain knowledge on inference in low-aptitude individuals. In A. Graesser & G. Bower (Eds.), *The psychology of learning and motivation* (Vol. 25, pp. 175–196). New York: Academic Press.