

Productive Group Work in Middle and High School Classrooms

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KEY POINTS AND STRATEGIES

Five Principles for
Cooperative Learning
Partner Talk
Reciprocal Teaching
Digital Collaborative
Writing
Problem-Based Learning

“You know what they say: ‘Two heads are better than one.’ I might as well use his.”

—Ben, age 15

Talk to nearly any secondary educator and he or she will speak eloquently about the way knowledge is built. He or she will recall the work of Vygotsky (1978), if not by name, then certainly through discussion of the zone of proximal development, which posits that a learner will accomplish more when given a bit of support, or scaffolding. In particular, he or she will note that learning is social—that it requires the interaction that comes from joint attention to a meaningful task. As Vygotsky (1978) wrote, “Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people ... and then inside the child” (p. 57).

And yet, in too many middle and high school classrooms, students are expected to sit hour after hour, taking notes and answering the occasional question with little interaction with peers. Teachers, knowledgeable about their content and feeling the pressure to cover the standards that will be tested each spring, regress to the very practices they know are not effective. The social learning theories they studied in their preparation programs have been abandoned in favor of predominately lecture-based courses.

The fear, of course, is that the moment students are placed in any kind of group-work situation, chaos will ensue. Most teachers have good reason to be concerned, based on their own experiences as learners and as instructors. As

learners, they have likely found themselves on the short end of the group-work stick—either given an unfair share of the work to do on everyone’s behalf or crowded out of the process altogether while a Type-A personality took over. As teachers, they have seen the proverbial cocktail party occur when they have given a simple set of instructions to “turn to your partner and...” In the meantime, the principal is making notes about the noisy classroom. No wonder few middle and high school teachers want to go to the trouble of creating group assignments. Even in classrooms where teachers feels otherwise assured about their ability to manage the logistics of group work, there may be a hesitation to allow students to construct their own knowledge. After all, what if students don’t learn what they are “supposed” to learn?

Truly productive group work should be about collaboratively building knowledge so that each member gains new understandings—what Scardamalia (2002) calls the “democratizing of knowledge” (p. 76). These are the skills that employers speak so highly of when describing the qualities they seek—the ability to work with others in ways that result in the successful resolution of problems for which there is no simple formula. In this chapter, we will discuss the conditions necessary for productive group work, the challenges of fostering more student responsibility, and our recommendations for future directions that will support adolescents’ abilities to engage in these learning situations. We illustrate these principles by describing the teaching and learning practices Aida Allen (third author) uses in her ninth-grade earth science seminar.

Why Is Productive Group Work Essential for Learning?

The evidence on the effectiveness of collaborative group work is compelling, and it appears to positively affect the way students learn even when not with peers. Topping and Trickey (2007) followed up on high school students who had experienced one hour a week of collaborative inquiry over a 16-month period during middle school. They discovered that these students continued to outperform peers on a standardized measure of academic ability two years after the experience ended. In another study, middle school science students who wrestled with incomplete ideas reached new understandings when given the opportunity to figure them out with one another (Hogan, Nastasi, & Pressley, 1999). Interestingly, although they took longer to reach accurate conclusions than the teacher-directed groups, they benefited from the kind of persistence necessary for formal scientific thought.

Scardamalia (2002) found that constructing an interesting problem to draw learners together and allow them to build knowledge lies at the heart of productive group work. She also refers to the “collective cognitive responsibility” (p. 67) of high-functioning teams, like flight crews that require members to be experts at a

specialized task but who are also able to take over for one another at a moment's notice. In particular, several conditions ensure that collective responsibility occurs:

- The work must be connected to real-world problems.
- The work must involve ideas that are improvable.
- The scope of work should not be overly prescriptive (groups find their own way).
- Group members should have shared responsibility for outcomes.
- The work should have embedded assessment that allows members to evaluate their own success. (Scardamalia, 2002, pp. 75–76)

These principles of knowledge building overlap with those described in the cooperative learning literature (Johnson, Johnson, & Holubec, 1993). Although many teachers first think of the social outcomes of cooperative learning, the research on the effectiveness of cooperative learning for content learning in secondary classrooms is persuasive (Slavin, 1996). There are five principles for an effective cooperative learning task (Johnson et al., 1993):

1. *Positive interdependence* of group members such that they need to rely on one another to solve the problem successfully—a sink-or-swim approach.
2. *Face-to-face interaction* to promote the personal investment group members have in one another, both academically and as people.
3. *Individual and group accountability* focused on goals and outcomes, so members are acknowledged for their individual contributions and their ability to be collectively responsible for the results.
4. *The teaching of interpersonal and small-group skills* to foster the social and academic skills needed to work together.
5. *Group processing* so members have opportunities to evaluate their products and determine how they might improve the ways they work together.

These principles of cooperative learning and the elements of knowledge building described by Scardamalia (2002) come together in the classroom through the use of effective instructional routines that foster productive group work. Although a full account of these practices is beyond the scope of this chapter, we have included the core instructional routines used in our classrooms every week. In the next section, we will describe how Aida Allen uses partner talk, reciprocal teaching, digital collaborative writing, and problem-based learning to build knowledge and academic learning in her ninth-grade earth science seminar course.

Instructional Practices That Work

The students enrolled in the earth science seminar have been learning about the natural resources and geology of their home state of California. This unit has proven

to be particularly interesting because students get to use knowledge gained from their geography course to analyze topographical maps and assess for natural hazards such as earthquakes, landslides, and wildfires. The unit emphasizes the importance of water in the state and the need to conserve natural resources. In addition, students analyze the data of the state, including population demographics and density patterns as well as the relationship between natural resources and economics.

Ms. Allen's students are accustomed to collaborative learning in their class because she uses this as part of a gradual release of responsibility model of instruction (Fisher & Frey, 2008; see Chapter 16 of this book for more information). Her instruction includes many routines that foster the social and academic skills used for productive group work. Now, these things don't just magically occur when you bring a few kids together and tell them to work. It takes the same kind of careful planning as any other part of the lesson. In order for students to become adept at collaborative learning, they must be exposed to it on a regular basis.

Partner Talk

The basic unit of any collaborative learning experience is the exchange of information that occurs between two people. Although it may be tempting to dismiss the need to encourage adolescents to talk to one another any more than they already do, in truth most have had relatively little experience with doing this in the context of learning and knowledge building. There are two considerations in crafting useful partner talk occurrences: establishing procedures and designing meaningful questions.

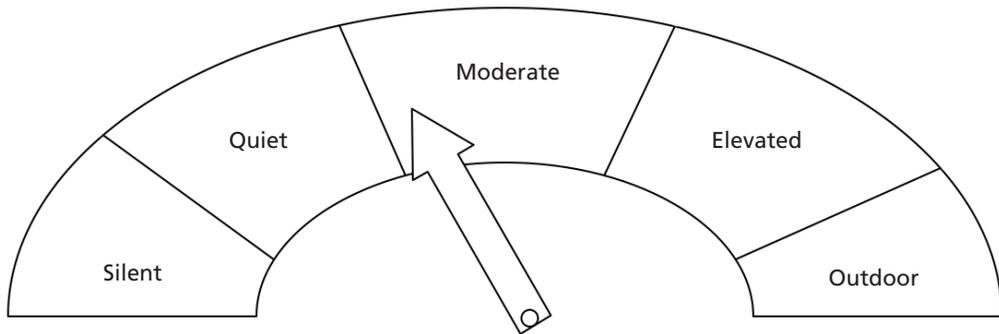
Effective partner talk procedures include two elements—letting students know your time and noise level parameters. We find that using a timer that as an audible and visual signal is most useful. The one we like best is an overhead timer that projects onto the screen to display the amount of time remaining. After announcing the time limit, we set the device to count down to zero. The timer also buzzes, but we've noticed that our students keep an eye on the elapsed time to pace themselves. We also introduce the noise level expectations at the beginning of the year. Although students may roll their eyes at the sight of the noise meter (see Figure 6.1), we have found that it serves as a good reminder about what our expectations are for maintaining a voice level that doesn't interfere with the partner conversations occurring around them (Frey, 2007).

An effective procedure doesn't result in much learning if the task isn't designed well. The cognitive framework first proposed by Bloom (1956) is useful for thinking about good partner questions. Because we focus much of our productive group work on knowledge building, we find that application- and analysis-level questions are especially well suited for these short conversations.

Application-level question stems include the following:

- What would happen if ...
- What would you have done ...

FIGURE 6.1
Noise Meter



Silent—when we take a test

Quiet—when we read and work independently

Moderate—when we are working in partners

Elevated—when we are working in groups

Outdoor—not here!

Note. From Frey, N. (2007). *The effective teacher's guide: 50 ways for engaging students in learning* (2nd ed.). San Diego, CA: Academic Professional Development. Used with permission.

- If you were there, would you ...
- How would you solve the problem ...

Analysis-level question stems include the following:

- What would you have used ...
- What other ways could ...
- How are these things similar or different?
- What kind of person is ... (Fisher & Frey, 2007, p. 44)

The easiest way to facilitate productive group work is to increase the amount of partner talk that occurs throughout each lesson. The goal in our classrooms is to provide a partner talk opportunity at least every 15–20 minutes. The combination of an effective instructional routine and an interesting question encourages students to think deeply about what they are learning while they are honing the social skills needed to exchange ideas with others. These routines pay off when using more formal instructional routines such as reciprocal teaching.

During an earth-science lesson, Ms. Allen posed several partner-talk questions to students. She shared information in the form of graphs on the differences between water availability and population size in northern and southern California, explaining that while one third of the state's population is in the north, almost two

thirds of its water supply is there. Conversely, two thirds of the state's population reside in the south, but only one third of the water supply is there. She then asked students an analysis-level question and displayed it on the screen: "Talk to your science partner for the next three minutes about this question: Based on this information, what do you believe are the major problems in determining how and where water gets used in the state?" She then reminded them about the noise level, saying, "Don't forget to use a moderate voice so others can talk as well."

Students turned to one another to discuss the question. Ruth told Alexis (all student names are pseudonyms), "If I lived in the north, I'd be charging you a lot!" Alexis giggled, but then offered, "Yeah, but I have all the people. You know what that means—votes! I can make sure you don't get what you want unless you make a good deal with us. SoCal rules!" The girls debated for the next few minutes, building knowledge by consolidating information from this and other classes.

Reciprocal Teaching

We have as yet to encounter a secondary classroom where reciprocal teaching would not be useful. First developed by Annmarie Palincsar and Ann Brown in 1984, this instructional routine has been shown to be a powerful reading comprehension tool across grade levels (Rosenshine & Meister, 1994). Because every content area includes reading material necessary for concept development, reciprocal teaching can support comprehension for all students. This instructional routine is meant to foster comprehension through the use of four strategies: question generation, summarization, prediction, and clarification. In this regard, it is understood as a method for externalizing the processes a reader should use to understand text. A further strength of reciprocal teaching is that it fosters dialogue between students, so that they become more skilled at posing questions, requesting clarification, summarizing information within conversations, and making thoughtful predictions about what the author might disclose in upcoming passages.

Reciprocal teaching procedures can be complex for inexperienced students, so many teachers will build capacity by introducing and modeling one comprehension strategy at a time and coupling it with role assignments. Over time, these roles are absorbed into the overall dialogue, but they do serve the purpose of supporting novice users. Because it is early in the year, Ms. Allen's earth science reciprocal teaching groups are still driven by role assignments. After moving her class into groups of four heterogeneous partners, she asks them to choose their roles: questioner, clarifier, predictor, and summarizer. The students have practiced each of these roles in previous lessons and are growing more comfortable with the process. Ms. Allen explains to her students:

We've been discussing natural disasters in California, mostly earthquakes. But there are other disasters that occur. I've got a newspaper article on the landslide in La Conchita in Ventura County a few years ago. Your groups are going to read and discuss the article.

Remember that it's not good enough that you get it. You need to make sure everyone in your group understands.

Ben, Ari, Andrew, and Sean quickly decide who'll be doing what and get down to the business of reading and discussing the article. Ben, the clarifier, asked what the word *slip* meant in the sentence "La Conchita is a slip of a town pressed between Highway 101 and a towering coastal bluff" (Wilson, 2005). "Does it have to do with sliding?" he asks.

"No, man, it means like a little...tiny town," says Andrew. "It's like an expression. It helps that it says 'pressed between Highway 101 and a towering coastal bluff.' That means it's squished. You know how tight PCH [Pacific Coast Highway] is to the shore."

Later in the same article, the boys talked about the connection between this disaster and the widespread effects of the storm in other parts of the region. Sean, serving as summarizer, pointed out that sinkholes, pipeline washouts, floods, school closings, and evacuations were mentioned at various points. "Even though the headline is about the landslide, the article's really about the damage the bad weather is causing all over the state."

Ari, the predictor for the group, offered, "I think the article will tell us more about the weather, since they said that this was part of the Pineapple Express... the bad weather from Hawaii."

Ms. Allen selected this reading not only because she wanted students to know about the La Conchita disaster, which claimed 10 lives and 36 houses, but also because she wanted them to make connections to their emerging knowledge of the topography of the state. The conversation the groups had helped many of them understand that this wasn't a situation unique to La Conchita, but rather a risk many Californians live with on the slopes of the state's mountains and bluffs.

Digital Collaborative Writing

With the rise of technologies, the practice of writing collaboratively has become infinitely easier. The best-known collaborative writing website is Wikipedia, the online encyclopedia visited by an estimated 683 million visitors annually (we learned this by reading the Wikipedia entry on Wikipedia on July 15, 2008). A version of Wikipedia, called Simple English Wikipedia, contains entries using the 2,000 or so most common words in English and is well-suited for younger readers, English-language learners, and anyone who benefits from more controlled vocabulary. Anyone can contribute information to existing entries or add new entries. Although Wikipedia does have its critics who argue that consensus but not necessarily accurate documents can result, many people have come to rely on it as a starting point for locating information. Wiki writing (*wiki* means "quickly" in the Hawaiian language) has drawn the interest of educators who are interested in finding new ways for students to jointly compose.

The purpose of collaborative writing is not the sequential editing that results when a paper is passed from one person to another, but rather that new knowledge is built from shared writing. Google Docs (docs.google.com) allows users to create a Word document on the Internet for use by other writers. Because one version of a developing paper or presentation exists in only one place, changes can be made and immediately seen by the other writers. In addition, there is a password protection system that ensures that only the writers, and not the entire digital world, can see the documents.

Collaborative writing can also occur within the discussion boards of course management systems such as Moodle, which is open source and free to any user. Discussion boards can be established by the classroom teacher to foster an online conversation about a topic or concept. Because students must be registered, they are not able to post comments anonymously, which reinforces the accountability for their work. The teacher determines the format and requirements, but a typical assignment is to reply to the question on an initial posting and then read the work of at least two other students and comment on their ideas.

During the unit of study on California's geology, Ms. Allen posted the following question for the students to consider: "After looking at the 'Keeping Water Resources Clean' website, think about ways in which the information you reviewed at this site will influence your own life. How does this alter your behavior or thinking?" Belinda wrote in her initial response,

After reading the article I am more aware that small everyday things such as improper disposal and how they can cause major negative effects on the ocean. I am more aware that those everyday mistakes can be a leading cause to damage to the beach and the closing of the beach eventually. I am also more conscious as to what I personally can do to prevent eventual damage to our local beaches.

Charlotte replied to Belinda's post,

I think there are many easy things that we could do to keep our water clean. One way is not polluting. When you pollute you expose everyone else in your community to the trash. Recycling is another big way we can keep our water clean. Many people throw bottles, and other plastic and aluminum objects into waterways. The bottles may get stuck in whales blow holes. I think protecting our environment is important if we want to keep it.

Maritza read both of these postings and replied,

I agree with you on everything but we also have to keep our air clean.

Ms. Allen's purpose for fostering discussion-board conversations is to integrate the back-and-forth nature of digital communication with the academic language of formal thought. She wants her students to become fluent readers and writers who are accustomed to the synthesis, evaluation, explanation, and argumentation

necessary in secondary writing. As well, she understands that this ability does not suddenly emerge when a term paper is assigned, but rather that student writers need lots of opportunities to read the writing of others, respond with their own ideas, and apply information accordingly.

Problem-Based Learning

Although problem-based learning (PBL) is typically thought of as emanating from the field of K–12 education, many are surprised to learn that it was originally designed as a method for increasing the learning of medical students who were faced with vast amounts of information to memorize, but little opportunity to apply it (Barrows & Tamblyn, 1980). It was quickly adopted by educators as a way of creating meaningful opportunities to build knowledge collaboratively. Once again, the principles of PBL dovetail easily with the guidelines for knowledge building and cooperative learning. An effective problem-based learning assignment should be structured such that (a) the students are responsible for their learning and the final product, (b) the task is deliberately ill-defined (hence, it is a problem), (c) it requires the full participation of all its members, (d) it reflects the type of problem seen outside the classroom, and (e) students are able to assess themselves (Barrows & Tamblyn, 1980). The following are examples of problem-based learning tasks:

- Developing a petition to change a local law or regulation
- Assigning a budget for the construction costs for a school addition
- Composing an editorial on an issue associated with alternative fuel sources

Ms. Allen introduces a problem-based task that students will use to coalesce and extend their understanding of issues related to the natural resources, geology, and economics of California they have been studying in this unit. Each group of four or five students will work as employees of a California county of their choice. They are to devise a plan for promoting the tourism and economic development opportunities for their county. Each group must research the demographic, topographical, and geological features of their area and complete an analysis of the county's potential in each of these areas. The students work with census data for population information, locate federal and state reports on watersheds, and evaluate the risks for a variety of natural and manmade hazards. They are also responsible for delivering a 10-minute PowerPoint presentation on their county to the other members of the class, and the presentation must include a trifold tourism brochure constructed using an online brochure tool (www.mybrochuremaker.com).

For example, Marco's group chose Imperial County and extolled the virtues of Mount Signal and Anza-Borrego Desert State Park in their brochure, but they also reported on the economic challenges facing this agricultural county as it competes

for a diminishing water supply. The group noted in their economic report that the county's large area (4,600 square miles) and low population (142,000) presented social service agencies with unique challenges. The relative lack of population centers also made it difficult to attract large employers. They evaluated the natural resources of the county, describing the Quaternary sediments that make up most of the Colorado Desert (of which Imperial County is a part), and reported on the reopening of the Mesquite gold mine as a new source of economic development for the region. As a teacher, Ms. Allen was pleased to see that the groups had to consolidate information from a variety of content domains, including English and geography. The complexity of the task was such that the group needed the full involvement and expertise of each member. For instance, Derrick used his technology skills to lead the development of the PowerPoint presentation but needed the content from the other members to complete the task.

Overcoming Challenges

As we stated at the beginning of this chapter, there are challenges associated with implementing meaningful productive group work in middle and high school classes. The first is in introducing and reinforcing procedures and instructional routines that contribute to social and academic skills (Frey, 2007). It is not advisable to begin the school year with a large problem-based learning assignment, if for no other reason than you don't yet know enough about your students' skill levels to develop groups that will work well together. It is best to start with shorter and less complex tasks, such as partner talk, and observe the students' development. Within a few weeks, you will have a good sense of who might need additional support.

A second challenge is in the design process itself. Productive group work is more than just clumping students together. In order for it to be meaningful, there must be a knowledge-building component. Recall and recognition tasks are less engaging to adolescents, who relish the chance to ask, "When will we ever need this?" Well-designed collaborative learning can allow them to answer that question for themselves.

Looking Ahead

You probably have noticed that much of the productive group work described in this chapter relies on the availability of new technologies. There is little doubt that the sea change of digital communication and learning will continue to have an impact on our classrooms and in fact demand that we do things differently. Although it is not possible to predict the type of work our students will do as adults in the coming decades, we feel assured that the need for both face-to-face

and virtual communication will be a common thread across professions. In the previous decade, the digital divide was characterized as the availability of hardware and software. As new technologies become integrated with our daily lives, we believe the digital divide will be about the relative ability to communicate effectively within and across groups. As the office cubicle disappears, will social networks take their place? We can't say, but whether it is leaning over a cubicle wall or managing a product team in another city, the value of working together productively will only increase.

EXTEND YOUR THINKING

- Complete a time sample of your classroom practices for a week to determine the average number of minutes per period when your students work together or discuss content. What patterns do you notice within and between periods? Establish a goal for increasing the time your students spend working collaboratively.
- What instructional routines and practices described in this chapter resonate with you? Are there some that would not be appropriate for your setting? What other methods not described here do you use?
- How do you evaluate productive group work? What assessment practices have you found to be the most useful?

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