



Team Teaching High School Science: Game Plan for Success

Ed Linz
Mary Jane Heater
Lori Howard

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Abstract

Recently team teaching has become more prevalent in high school classes. These teams often pair a general education teacher with content knowledge with a special education teacher. Due to a lack of detailed knowledge/experience in the other's area of expertise, many team teachers in science courses are confronted with unique challenges. In this article, a general education science teacher and a special education teacher share how they successfully developed their "team." Through the use of a sports related metaphor, "the game plan," these teachers provide insight into how successful co-teaching relationships can be fostered. Both teachers describe the importance of common planning time, and sharing responsibilities for instruction, grading, and parent communication.

Keywords

co-teaching, collaboration, science

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Co-teaching has become more prevalent in high schools as a way to foster inclusion of special needs learners (Friend & Cook, 2007). An increasing number of high school science classes are being team taught by a general education and a special education teacher. Many high schools are offering inclusive Biology, Chemistry, Geosystems, and Physics classes (Grumbine & Alden, 2006).

This trend toward team-taught science classes is complicated by: (1) science teachers' lack of training or experience with the special education population (Grumbine & Alden, 2006); and (2) special education teachers' lack of knowledge/experience in the teaching of science content. While specific statistics are not available on the number of special education teachers "highly qualified" in science content, science has traditionally been an area that experiences teacher shortages (U.S. Department of Education, 2002). The result is that more and more school systems are forced, by necessity, to team a special education teacher who has little science background with a science teacher who has little special education background to teach inclusive classes containing large numbers of students with special needs. The resulting team is often sharply divided in terms of expertise, with the potential for friction, conflict, and, most importantly, less than desirable student outcomes, both in terms of classroom performance and high stakes standardized testing.

There are many commonalities between successful approaches for teaching science and meeting the needs of special educa-

tion students, which can become the foundation for a good co-teaching relationship (Austin, 2001). Good science teaching involves considerable hands-on opportunities (e.g., labs and demonstrations) which are ideal for teaching most students with special needs (Steele, 2007). Students seem to be particularly fascinated by many of the standard lab exercises in science (e.g., magnets, pendulums, chemical experiments, microscope work). This eagerness to explore can be exploited as a learning opportunity in a well-managed science classroom. Other commonalities between science and special education include an emphasis on movement/transitions,

cooperative learning (during labs and classroom activities), mnemonics and vocabulary. In short, many of the successful strategies employed by skilled science teachers are also utilized by experienced special education teachers and vice versa.

The challenge becomes how two teachers with different backgrounds can use these commonalities to develop outstanding science classrooms with an inclusive

set of students. One approach which the authors have developed is presented here. Our team was born from the ashes of two unsuccessful team-taught experiences with other colleagues. In one instance, the general education teacher exhibited little interest in providing assistance to special education students in the class; in the other situation, the special education teacher made minimal effort to learn the science material and acted as a disciplinarian. Our plan was to develop a successful strategy based in part on a sports analogy: the school year was much akin to a

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football game, with the goal being to “win” by having each student achieve academic success in the classroom and pass a state-wide standardized test at the end of the school year. For planning purposes, we divided the school year into three segments: pre-season, regular season, and post-season.

Pre-Season

Just as general managers look at rosters and coaching personnel long before the season begins, school administrators need to carefully examine the composition of their special education and science staffs prior to making team assignments. Because different administrators may have cognizance over the two disciplines, coordination may be required. Department chairs should play a key role in the decision process to ensure that the personalities and competence of the team teachers be matched (Friend & Cook, 2003). Although this is an imprecise process, it is critical not to make assignments which are doomed from the start. For example, if a science teacher has no background in special education, it would not be prudent to assign a special education teacher who has absolutely no background in science. Our experience has been that teachers themselves often know which teams will work. It is important, therefore, for administrators (or whoever makes the teaming assignments) to make the process transparent and inclusive, so that all parties have a role in the assignment process (Murawski, 2005). What does not work is simply

assigning two individuals without consideration of the personalities and talents involved.

Once the assignments have been made, the team teachers need to meet prior to the beginning of the school year to get to know each other, to trade philosophies, teaching styles, classroom management priorities, grading schemes, and any other items which come to mind during these meetings (Rice et al., 2007). We have found it helpful to talk through expectations of student behavior, assessing learning, methods of presentation, and various hypothetical issues typically encountered both for a single classroom period and for an extended grading period. This phase is essentially a trust-building session in which each participant begins to understand how the other “works” in the classroom setting. It is also a good time to ensure that the coming workload will be equitable, that is, to discuss who will be doing what in terms of unit preparation, assessment, grading, and parent conferences.

It is critical during this initial phase to lay groundwork to ensure that both teachers will be seen

as “teachers” by the students once the school year has begun (Murawski, 2005). It will be tempting for the science teacher (usually the “content” teacher) to assume responsibility for the majority of the actual daily teaching. Our view is that this approach is ultimately counterproductive, because it often leads to “I teach, you work with students” mode, where one teacher is perceived to be doing the vast

From the Science Teacher

My greatest challenges were:

(1) To share ownership of the material; that is, to trust my partner to deliver the lessons just as well as myself.

(2) To learn how to work individually with students with widely-ranging disabilities.

(3) To appreciate different learning styles and to adjust my delivery accordingly.

majority of teaching, and the other is simply an assistant (Magiera & Zigmond, 2005). We have found that our students find it difficult to identify the “content” teacher, because *we both deliver instruction*, and we both provide assistance to individual students while the other is teaching. We also alternate preparing and grading tests, quizzes and other assessments. It is not important to make specific assignments during the pre-season meetings, but it is very valuable to establish agreement that there will be equity in all phases of the team (Friend & Cook, 2007).

The next pre-season task is to develop a syllabus for the course, which, while meeting state and local requirements, also reflects a *realistic pace* for an inclusive class. From the syllabus, the team should then prepare unit/lesson plans for at least the first month of the school year. There should be a rough outline of when projects and labs will be incorporated into the schedule, and what expectations will be for such assignments. For example, will all labs have written reports, will deadlines for projects be firm, how will make-ups for labs be handled?

During this preseason phase, accommodations for students should be discussed. If student lists are available, the team should discuss specific accommodations for individual students and what modifications to

instruction/assessment will be made. This is an area in which the special education teacher must take the lead to ensure that all legal requirements are met.

The pre-season is also a time for the science teacher to suggest areas where the special education teacher can take the teaching lead. We found that during our first year together we were comfortable with the science teacher taking responsibility for the presentation of most new material, while having the special education teacher identify “comfort areas” where prior familiarity with the subject (such as the solar system) led her to take the primary teaching responsibility. We also learned that by having the special education teacher take responsibility for warm-up activities (essentially a review of previous material), and vocabulary exercises, both of us were teaching for nearly identical times over the course of a week. In our second year, we found that we were able to split the primary teaching tasks, once the special education teacher gained familiarity with the science material, while the science teacher was able to provide some of the warm-up and review duties.

In summary, the primary objective of the pre-season is to develop trust within the team while becoming fully prepared for the games about to begin.

From the Special Education Teacher:

To have a successful teaming situation, the special education teacher must be a full partner with the content teacher. This can be difficult when you are placed into a content area for which you have little knowledge, but it is imperative that you learn the content. You almost have to participate as a student during the first year of teaming, doing all the labs and homework, and staying at least one step ahead of the students! Take responsibility for the study review sessions before each quiz; students will see you as a member of the instructional team. I used this opportunity to teach study skills. When you feel confident enough with the content, you can prepare some of the quizzes. By the second year, you should begin to share content delivery. My advice is to not sit back and think that the content will come to you. Jump in and learn it!

Regular Season

The first day of classes is important for any teacher, but particularly for a team. How students perceive the dynamic between the science teacher and the special education teacher on day one will set the tone for the course. It must be a genuinely joint effort with seamless transfer of dialogue and instruction. For example, on the first day of our class, the Special Education teacher begins by discussing the syllabus of the course, with science-related anecdotes interjected by both teachers. The Science teacher then follows by going over class rules and expectations while the Special Education teacher provides appropriate clarification. All first day handouts should have the names of both teachers, and care should be taken to mention each teacher's name at the same time. It is "our class" and you are "our students." We found it useful to merge our class lists so that the students are unaware as to who is on whose class roster. We maintain this merge throughout the school year – students have no idea that they are on the science teacher's roster or the special education teacher's roster – they are simply in "our" class.

In science, it is particularly important for both teachers to be able to do all of the assigned work. We both complete each assignment before the start of the class, so that each of us will be comfortable explaining concepts, doing problems, conducting labs,

and answering student questions during class. This may require more effort on the part of the special education teacher, at least during the first year in a given subject, but it is critical to the credibility of the team that both teachers are perceived to be experts and interchangeable parts once the material has been presented. If the special education teacher does not understand the assignment, how can the students be expected to master the material?

With 90-minute classes, we found that

it is very useful to take turns presenting material. Inevitably one of us will make an error during our presentation. In science, the error can be either an inaccurately described concept, or a miscalculation during a numerical problem. It is important to discuss how the team will handle this type of situation before it happens. Our decision was that the teacher who recognizes the error should immediately bring it to the attention of the other teacher and the class, often in a light-hearted manner. By

using this technique, the students benefit by not leaving the class with a misconception, and we demonstrate to the students that we are both fallible and a team. We have found special education students to be particularly receptive to this approach because they observe that everyone makes mistakes and that it is both appropriate and useful to correct errors when they are noticed. Other teams may wish to adopt a different approach, but dis-

5 Things a Special Education Teacher Can Do!

- **Take a summer class on a science topic.**
- **Join the National Science Teachers Association (<http://www.nsta.org>).**
- **Read a science-related book (such as, "A Short History of Nearly Everything," by Bill Bryson).**
- **Do the homework before the students.**
- **Ask questions of the science teacher.**

cussing how you will handle this situation is paramount.

We also divide assessment and grading responsibilities. The science teacher made up most of our assessments and labs during our first year together, but in the second year the special education teacher assumed greater responsibility. Now we alternate putting tests and quizzes together. Our policy has been that the person who prepares the test, grades the test. Very few of our assessments in science involve multiple choice questions, as we prefer that our classes of inclusive students learn to show their work so that we can better determine what they do not understand. We use our assessments to identify areas requiring remediation for the entire class, and especially for individual students who are struggling. Our experience has also shown that it is very important for both teachers to take our tests before the students so that we ensure that the test is fair, understandable, and thorough. Having taken the test ourselves, we are then both comfortable going over the test with the class – in fact, we usually alternate questions in our post-test review.

We also work together as a team to connect with parents. Both of us are comfortable contacting the parents of any of our students. Once again, when we have discussions with parents, we use the term “we” and “our” often when describing observations and con-

cerns regarding the student. It has been interesting to see the reaction of parents when a special education teacher is fluent in science when discussing a child’s progress. Most of our parent conferences have been managed by that member of our team who has the student on her roster. However, for those meetings which are foreseen to be potentially difficult or complex, both of us participate in planning and conducting the conference. We take this same approach when working with counselors and administrators.

The most important aspect of the “regular season phase” of team teaching science is frequent review of what we have accomplished and what we have remaining. We discuss our progress at least monthly so that we are comfortable that our students have achieved understanding. We regard our syllabus as a “living document” which may have to be amended due

to unavailability of lab equipment at a given time or other unforeseen events (snow days!). We also use the experience gained one year to improve our planning for the next year.

In summary, the “regular season” phase of team teaching in science is a fluid sequence requiring adjustment, collaboration, and patience. Unforeseen problems will arise, but the team must work together to resolve these challenges.

5 Things a Science Teacher Can Do!

- **Understand WHY and HOW an I.E.P. is constructed**
- **Attend in-service training on team teaching**
- **Actively participate in I.E.P. meetings**
- **Become familiar with the specific accommodations of each special needs student in the class**
- **Observe other team-taught classes in several content areas**

Post-Season

We like to think of the end of the school year as the start of the following year. Just as coaches watch game film to analyze problems and identify weaknesses to be corrected prior to the next season, team teachers need to reflect on what has worked, and what has not worked as part of the assessment of the actual collaboration (Wiggins & Damore, 2006). By making changes to lesson plans and the syllabus throughout the school year, the burden of this phase can be greatly reduced. Our experience has been that many of the labs which were derived from general education classes have room for improvement. What works for a general education science class often does not for an inclusive class with many special education students. This is also an excellent opportunity to search for new resources to incorporate into next year's lesson plans.

The "post-season" should be used to make a very critical assessment of the efficacy of the course. By the end of the school year, most states have detailed results available for the mandatory testing which has taken place. Are there areas in which your students have performed poorly as a group? What can you do to improve performance in those areas? Are other teams having similar issues? Is there a need for additional professional development courses in a given area? Has the team developed friction which cannot be overcome? Should the team attempt to remain together, or should an effort be made to switch players?

In our state, there is no state-wide test for Physics. However, we have structured our course to re-enforce Algebra I skills because many of our students have experienced difficulty in passing the state-wide end-of-year assessment in that subject. We used results of this test as one benchmark to evaluate our

performance. In the past two years in which we have used this approach, our students have outperformed control groups both in our own school and district-wide. We did, however, identify specific topics (such as statistics) which require improvement on our part. We also noted that certain sub-groups of students consistently underperformed on this test. We have modified our approach and lesson plans for the current year to attack both problem areas.

In short, the "post-season" is a time for analysis, discussion, and modification. The foundation for the coming year begins now.

Conclusion

Team teaching in science is all about trust and equity. Although "good" teaching is generic, that is, what works well in both general education science classrooms and in special education settings also works in the team taught science classroom, there are unique challenges presented by an inclusive science class. Both teachers must work to ensure that they are competent in terms of presenting content and understanding the special needs of each of their students. This will require patience on the part of both teachers, as the special education teacher learns content which may be very unfamiliar, and the science teacher adjusts to the challenges of a large number of special education students with highly diverse needs.

The development of a highly effective science team is not accomplished overnight. It requires patience, insight, hard work and, a sense of humor. We believe that the key ingredient is trust – trust in your partner as she/he becomes just as competent as yourself. But the rewards are great and we believe that our students are the real winners.

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About the Authors:

Ed Linz teaches physics at West Springfield High School in Springfield, Virginia, and writes a weekly newspaper column.

Mary Jane Heater is a special education teacher who teaches both teamed and self-contained Active Physics at West Springfield High School in Springfield, Virginia.

Lori Howard teaches the collaboration and consultation classes at the northern Virginia campus of the University of Virginia.