The One Hundred and Eleventh

Gen Chem Games

SAM Course, Fall 2013

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Introduction

Last year, the SAM students decided to base the theme of their SAM book on *The Hunger Games*. Yes, the violent movie basically about gladiator games, only with children--or so I thought. Everything I had heard in the press was that *The Hunger Games* was very violent. I am not typically drawn to stories that are violent, and I was also concerned what this violent connotation might imply about *General Chemistry*. Did the SAM students think that General Chemistry is a fight and that students need to work against one another? This is not the *General Chemistry* philosophy, let alone the PLTL philosophy, at Washington University. However, as usual, Dr. Lutes calmly assured me that *The Hunger Games* is a complex and compelling story that would fit well with the philosophy of PLTL. Dr. Lutes was correct, as she is every year. But she always makes me determine for myself what the connections are between the SAM book themes and the PLTL philosophy!

The Hunger Games trilogy by Suzanne Collins. . . I tried to take a short cut, but there was nothing useful on the Web! I had a choice: watch the movie or read the books. I read the books while I was at a national chemical education conference this summer. I was riveted by the story. There were many insights--many more than I will discuss in this introduction. I encourage everyone to read the trilogy.

In *The Hunger Games*, Panem (a country that was formed from an apocalyptic North America) consists of a capitol and 13 separate districts [although in book 1, District 13 was thought to be totally destroyed]. At the beginning, the districts are all working separately, each populated by people with distinct skills (i.e., strengths); for example, District 3 makes electronics, the District 6 skill is transportation, District 12 mines coal, and District 13 has nuclear power. In addition, each of the districts dedicate the district's "talents" to take care of the capitol. The districts do not interact with each other and do not combine their skills for a more productive environment for all; instead, they individually apply their skills for the good of the capitol, thereby trying to help only the capitol to be sustained. Underneath a veneer of success, Panem is breaking apart. Even at the capitol, there is discord, as well as a lack of progress. By the end of the trilogy, however, through determination, collaboration, and trust in one another, the people of Panem come together as a community. All 13 districts and the capitol work together for the good of the entire country. People from all of the districts and the capitol collaborate to improve the lives of everyone, and together they create a thriving and prosperous country.

Similarly, students in General Chemistry begin as individuals striving to learn chemistry. Through PLTL, however, they learn to work collaboratively and become successful not only in learning chemistry, but in transitioning to become a successful student at the university. PLTL students discover that working together makes everyone perform at a higher level than if each work independently. This is the theme of *The Hunger Games* trilogy and the theme of PLTL and General Chemistry at Washington University.

Below are the key ideas from *The Hunger Game*s that we can see reflected in this year's SAM essays.

1. **Working together to succeed.** Throughout the trilogy, people who work together as a team are successful in their endeavors even though the original goals of any competition were set up to allow only one person to win. If the tributes, the victors, or the districts had not worked with one another, none of them would have been successful in the competition in which they were participating. For example, Katniss's success was completely dependent upon working with others in any circumstance in which she found herself. Her strength was the ability to collaborate with other people to succeed. Similarly, PLTL students work collaboratively to learn how to problem solve and think critically about chemistry. Together, PLTL students understand the concepts more deeply and learn how to solve more complex problems than if they only studied alone.

2. **Many techniques are needed to succeed.** In the arena, as the tributes were preparing for the competition, they needed to learn more than one skill. In addition, they needed to practice to improve their skills, and often the skills that did not seem initially to be useful turned out to be essential. This theme was especially clear during the victors' competition. In PLTL, it is also essential for students to learn different skills and to use different collaborative-learning strategies during PLTL to develop these different skills. It is also important for students to come to PLTL regularly to continually practice and improve their skills to reach their potential in General Chemistry.

3. **Forming communities (teams) is essential for the tributes, the victors, and the districts to thrive and flourish.** From the very outset, Katniss and the people in District 12 formed strong teams to survive the hardships put upon them by the capitol. The tributes also form teams during the gladiatorial match, and the successful teams contained people with different skills and strengths. This theme is seen throughout *The Hunger Games*. The ability to work effectively as a team with a diverse set of members is a major component in thriving and flourishing in General Chemistry. Being in a PLTL group, moreover, is an excellent way to learn to work as a team with people of differing talents and skills.

4. **Mentors are important for success.** Throughout the trilogy, victors mentored the current tributes, and the more-experienced victors mentored the less-experienced victors. This kind of metoring is analogous to the PLTL leaders mentoring their PLTL groups--passing down knowledge and insights to less-experienced students. Similarly, the experienced PLTL leaders mentor the new peer leaders. Having the peer leaders meeting as a large group every week in PAM solidifies the knowledge from the more-experienced leaders into the minds of the new peer leaders. In this manner, knowledge and skill are transferred down through the years of the PLTL program.

In the beginning, Panem is a disparate set of districts and in the end, Panem is a community. Similarly, at the beginning of the semester, each PLTL group consists of separate individuals-- each with his or her own goals. By the end of the semester, through participating in PLTL, each group becomes a community of learners working together to develop problem-solving skills in a way that helps each person reach his or her potential, while becoming a contributing member of Washington University.

This book contains insights about effective PLTL implementation that the SAM students have discovered during their first semester as peer leaders. The remainder of this introduction will give you a glimpse of these insights, which the SAM students want to convey to new peer leaders.

The first PLTL-group meeting is exciting and scary. **In the first section "*May Your Group Be Ever in Your Favor,"* the leaders remind us that PLTL is about community.** More importantly, the development of community starts that first day, but continues throughout the semester. **Iris Kuo** reminds us, "As the students begin to trickle in, chat with them so that you're not all sitting in complete silence . . . It may be uncomfortable, but the more enthusiastic you are, the more enthusiastic they'll be." As **Katherine Aulis** encourages, "consider also doing icebreakers in the subsequent weeks. . . . The better they got to know each other, outside of chemistry knowledge, the more comfortable they were speaking up, debating, and sharing ideas when it came to working through the problem set." **Maya Ladenheim** gives one of the key PLTL components in a nutshell, "One of the characteristics that sets PLTL apart from other mentoring groups is the strong emphasis on collaboration among all students . . . establishing a welcoming atmosphere encourages collaboration right from the start."

All of the leaders in this section advised going over the PLTL philosophy. As **Lauren Dunlap** learned, "No one wanted to throw out any ground rules in my group, so I just moved on to the problem set. Don't do that! . . . come up with a set of agreed upon rules for your group. That way, you can refer back to them throughout the semester whenever you need to."

Kerrin Sunshine gives you freedom from anxiety, "No matter what happens the first day…just be enthusiastic and welcoming, and you will establish an atmosphere that will allow you to work out all the kinks in future sessions." As does **Joash Suryavanshi,** "You aren't expected to know all the answers, only to guide your students in the right direction so they can think for themselves and find the answers together."

You made it through your first session; now what about the rest of the semester. **In section 2, "*Training for the Arena,"* the peer leaders discuss how to become an effective peer leader.** The leaders suggest preparation, following the key components of PLTL, using PLTL resources such as PAM and interrogative assignments, and being a mentor. **Rahul Aggarwal** assures us, "No one starts as an expert. Developing a successful PLTL requires a lot of preparation and a broad variety of knowledge." **Daniel Cohen** suggests, "to prepare for the arena, you really have to 'prepare for the arena.' . . . Use one of the awkward breaks between classes once or twice a week and you will be set. "

Michelle (Hye Soo), Margery, and Matthew give a number of useful tips. **Michelle Chung** recommends, "Remind your students that you are never going to provide them with direct answers. . . .

As tough as it can be, it will help your students develop confidence in their answers and succeed in GenChem." **Margery Gang** agrees, "The most important take-away from PLTL for students…should be a gain of academic self-confidence." **Matthew Katz** has a wonderful list of tips; here is one "Use open-ended questions . . . Take advantage of the interrogative assignments that Dr. Daschbach makes available before each session."

Aileen Ren ends her essay with great advice that we should all remember, "you are one of their role models…you should carry yourself the way you want to be seen both in and outside of the section. We are all a team and we want them to succeed!"

As much as we try, mid-semester is difficult for all of us: instructors, peer leaders, and students. **The peer leaders writing in section 3 "*PLTL 13: There's Nobody Here*" give great suggestions about this tough time of the semester.** I will add only one more – try hard and forgive yourself.

Clarence Chu gives advice we all need to be aware of, "As their mentor you have to lead by example. . . . If your tributes get the impression that their mentor is not prepared for the sessions then they are less likely to be prepared also." **Meredith Rae** recommends, "remind them of the importance of staying on top of the material in Chemistry, and how two hours spent at the session will be beneficial."

Sharon Jiang encourages us, "Be enthusiastic and excited about being there and doing chemistry for two hours…If you're going to spend two hours on chemistry together every weekend, why not try and make it enjoyable?" **Alekses Clifton** gives us a great suggestion to fight the mid-semester slump; "Changing the way your session is run can also help decrease the effects of the mid-semester slump."

Vincent Stephen reminds us, "The point of this section is . . . to tell you that you already know everything you need to know! It is all simply just a matter of sticking with it and putting the extra effort when you need it." **Benjamin Yu** points out "never forget to provide positive feedback, especially when the students are hitting that slump!"

What are these collaborative-learning strategies? Why do we use them and do we REALLY need to use them? **The peer leaders in section 4 "*I Volunteer As Scribe!*" give explicit tips on how and when to use specific collaborative-learning strategies.** They also explained why collaborative-learning strategies are vital to the success of your PLTL group.

Saya Bery encourages, "Remind each member. . . they are an essential part of the PLTL group; without one person participating or following the collaborative learning strategies, the entire group falls apart." **Emily Feng** emphasizes, "A large part of our success in PLTL hinges upon our ability to wield the tools and strategies taught to us skillfully and effectively." **Sandhya Ramaswamy** reminds us, "another crucial aim of the program which many participants overlook: to help students learn how to work with peers and become comfortable with collaboration." **Michelle Recto** notes, "each one of these methods is useful in its own way and appeals to different students."

Aakash Gandhi correctly points out, "While PLTL is certainly a time for group discussion, even the best of sessions are rarely collaborative during 'whole group' discussions. . . . While the collaborative learning strategies may at first seem like an unnecessary obstacle, wielding them effectively will actually increase the output of your sessions." **Megan Kawasaki** has the following tip about scribe, "You could also switch up the scribe every so often, especially for longer problems, which is a good way to encourage more active participation from the more introverted members of the group."

Alexandra Rhodes gives wise advice for one to follow, "During my first session, I established that we were going to follow the collaborative-learning strategies by the book. Once the students realized that each question would follow a learning strategy, they stopped complaining about them and became used to the fact that this was how our sessions would be run."

The final section (section 5), "*The Student On Fire*" discusses tips on group dynamics. Establishing effective group dynamics is a semester-long endeavor, with many target points along the way. **Jessica Erlich** notes, "after the first few sessions, your group's dynamic may shift from quiet and nervous to one in which students feel more comfortable to be themselves. . . . It is important to balance these various types of students while maintaining a comfortable, open environment." **Vivek Mehta** reminds us, "Students should be allowed to talk and socialize with each other…However, always emphasize the PLTL philosophy and that they are there to do the problems and learn."

Sarah Swiezy points out, "how do you get more of your different types of students involved? Enforce the collaborative-learning strategies—early . . . and repeatedly throughout the semester." **Vidit Talati** emphasizes, "it is your job to understand the personality of your students and shape your sessions in such a way that all the students feel comfortable around each other and you." **Victoria Cooke** cautions us of being too fast-paced, "It can be really tempting to race through the problem sets during PAM because it's Friday afternoon and no one else seems to have any questions or doubts about any of the concepts. However, if you have a question, chances are good that a student in your group or another leader's group, or even another one of the leaders, has the same question, so it will benefit everyone else in PAM."

Every fall since 2003, I have had the privilege of working with the peer leaders in *General Chemistry*. From this experience, I have learned a great deal—not only about effective implementation of the PLTL approach, but also about community, team work, collaboration, and mentoring. My introduction to the fascinating story in *The Hunger Games* trilogy is just one example of how SAM students have expanded my horizons.

I hope that you enjoy learning about collaboration, community, and mentoring from your colleagues in the PLTL community as much as I have. As you journey through your first semester of peer leading, I challenge you to form a collaborative peer-leader team that will lead you to expand and improve one another's skills, knowledge, and expertise. I also encourage each of you to become a contributing member of the flourishing PLTL peer-leading community at Washington University. I look forward to working as a team with you and Dr. Lutes during this journey.

Regina Frey

1033 Words of Wisdom
By Katherine Aulis

Let me begin by saying congratulations on becoming a PLTL leader! For some, you may have already had some experience teaching. But chances are that for most of you, this will be a new experience, and it takes practice to get comfortable. The first day is by far the most nerve-racking, so I'd like my essay to just be some advice I've learned from experience or from teachers on how to make the first day, and the rest of the semester, go smoothly.

One of the most important things is to start out your first session with an icebreaker. Almost everyone in your group will be a young freshman, still adjusting to college life. Chances are they won't know anyone else in the group. It's up to the PLTL leader to make everyone feel comfortable. Doing an icebreaker on the first day helps everyone start to get more comfortable and get to know each other. But consider also doing icebreakers in the subsequent weeks. For the first few sessions I always started with a "would you rather…" question. I think it was worth it to use up a few minutes at the beginning of each session in order to get my students more comfortable with each other. The better they got to know each other, outside of chemistry knowledge, the more comfortable they were speaking up, debating, and sharing ideas when it came to working through the problem set.

It's also important for you, as a PLTL leader, to learn your student's names as quickly as possible. By making a point of addressing everyone by name, they will feel more included in the group. It also demonstrates to the students that you think knowing everyone's names is important, and it gives them more opportunities to hear other student's names and start to learn them.

The next step is explaining the PLTL philosophy. As the students read through the "PLTL philosophy" sheet, be sure to explain to them WHY we follow PLTL as we do. As a freshman, I never really understood the reasoning behind why we can't tell students the answers, or why we can't teach them directly. It was not until after becoming a PLTL leader that I fully appreciated how PLTL was run.

Your students will be more willing to follow the PLTL philosophy if they understand how they are benefitting from it. Furthermore, it is imperative that you don't break from the PLTL philosophy, especially in the first few sessions. It's easy to trip up and accidentally confirm the right answer for someone, but if the students see that a PLTL leader is relaxed about following the PLTL philosophy in one session, they will no longer expect you to follow it in subsequent sessions, and it becomes much harder to get students back on track.

Another piece of advice for all your PLTL sessions is to show your students why you love chemistry. Even if you don't want to admit how much of a science nerd you are, that kind of thinking rubs off on your students. Students are used to seeing teachers get really excited about the subject their teaching, and to see an undergraduate peer show that kind of excitement makes even more of an impact. That doesn't mean all your students are going to walk out of there loving chemistry, but it makes everyone a little more engaged while going through the problem set if you tell them how much you love a certain kind of problem, or why you think a certain topic is really cool. On the reverse side, if students are complaining about a class (even classes other than chemistry), it is important not to agree or join in with their complaints. You are their peer, and we all have classes, teachers, and exams that seem annoying, unfair, or tedious. Maybe you have even complained about that professor in the past. But if you agree with your students that you didn't like that professor or that class either, they will stop seeing you as their mentor and leader, and they will see you more as another student, an older student, validating their claims. I have personally made this exact mistake in the past. I wanted my students to like me, so I joined them in talking about how difficult and tedious another class was. But in all our subsequent conversations, it was much more difficult to get them to focus, because they would then say things like "do you really think we need to do this? Don't you think this is unnecessary, or boring?" Even if I said that I thought it was really important, they no longer believed me. It is more important that your primary goal is to get students to respect you, rather than befriend you. Friendship can, and may, come later. While we all hope that all of our students will like us, you need to still maintain some level of authority during your PLTL sessions. Otherwise it becomes very difficult to get students to stay focused, get through the problem set, and get the most out of PLTL. If your students respect you, they *will* like you. You don't need to be their friend first in order to make that happen.

My final piece of advice, and one of the things I still struggle with, is wait time. Wait time is the amount of time you should give your students between when you ask a question, and when you jump in if no one is answering. Wait time should be around ten seconds, and that will feel like forever when

your PLTL group just sits in silence. Everyone needs time to think through an answer and get up the courage to raise his or her hand and respond. It will feel like if no one answers your question right away you need to immediately clarify, but you don't! Those long ten seconds of silence are just as uncomfortable for them as they are for you. It will push kids to give an idea they weren't very sure about, or push a quieter student to speak up. Wait time is one of your best tools; use it to push your students further.

You've Been Selected
By Lauren Dunlap

Congrats on being selected to be a PLTL leader! It is your FIRST DAY! I didn't think I'd be nervous, but I was. I felt anxious about what my group would be like, who would be in it, if they would ask hard questions, if I would be a good leader, and tons of other stuff. If this is you…stop worrying! I soon found out that the first day is the most fun day of PLTL! Here are some tips to help you prepare for it:

Email

Send an email a few days before your first session telling them what to bring and where/when you will be meeting. They are most likely way more nervous than you are, and this will comfort them a lot.

Come Prepared

Get in the habit of preparing for sessions right off the bat. Set aside some time every week (best to be between PAM and your session) that you will look over your old notes and the Interrogative Assignment. Try to remember concepts that were hard for you and jot down a few open-ended questions to start discussion about them. The students might be shy the first week and not want to discuss, but keep asking questions—it will help them understand the material throughout the semester! Also, get to your room early to rearrange the desks. Bring markers/chalk as well, because you never know what your room will have in it! Lastly, but maybe most importantly: BRING FOOD! It is a good idea to make a schedule of students to bring food throughout the semester, if you don't want to worry about it every week.

Be yourself!

Try not to be nervous and just be yourself. My first session, a girl in my group came 15 minutes early. I quickly ran out of my "prepared conversation starters" and just chatted with her like any other student I would meet on campus. Talk about classes you are taking, clubs you are involved in, where you're from, what your major is, what dorm you lived in…literally anything! Just be comfortable and be yourself, so they will do the same.

Icebreaker

Think of a fun icebreaker to play. It doesn't have to be super original, but make sure it includes everyone and they say their name at some point. You should play too! Speaking of names, I am AWFUL with names, so I had a list of their names with me for the first few weeks, and I had them make nametags the first day so they could learn each other's names.

Ground Rules and PLTL Philosophy

Make sure to go over the PLTL philosophy and create some ground rules. No one wanted to throw out any ground rules in my group, so I just moved on to the problem set. Don't do that! Give them some ideas, embrace the awkward silences and come up with a set of agreed upon rules for your group. That way, you can refer back to them throughout the semester whenever you need to.

Your first session will be a ton of fun—you get to meet your students and have your first experience as a leader! But it will probably be filled with awkward silences and not knowing exactly what to do. That is okay. Learn from your mistakes and get excited for a great semester to come!

First Day Fun
By Iris Kuo

For my first PLTL session, I actually remembered to bring everything (the dry erase markers, snacks, napkins, extra periodic tables, etc.) EXCEPT for the packets for the students. Oops. Luckily, I had arrived early, so there was time to dash back to my room, grab them, and run back before the session began.

Hopefully your session has a smoother start, but even if it doesn't, you can still recover. The main thing I kept in mind was this: remember the sort of environment you're trying to create. It's a short list, but this really helped to guide my actions.

First thing's first—preparation. Send a friendly email notice to your group the day before your session to introduce yourself, inform them of what to bring, and remind them of the time and place. Next, be sure you have everything you need, and don't make the same mistake I did! You'll need your packet, their packets, the sheets with the PLTL philosophy, the dry erase pens or chalk depending on your room, and, most importantly, snacks. The snacks aren't mandatory by any means, but food is definitely a great way to tip the odds in your favor and get your group to warm up to you. Arrive at your classroom 10-15 minutes early so that you can rearrange the tables if necessary and be present to greet the students as they walk in.

As the students begin to trickle in, chat with them so that you're not all sitting in complete silence. This serves several purposes. It gives you something to do other than sit there with all your nerves, it'll help you get acquainted with the students, and it makes the environment a friendlier and more welcoming one. For the first session (and maybe even the second and third sections), prepare an icebreaking activity. It may be uncomfortable, but the more enthusiastic you are, the more enthusiastic they'll be. This will be true for the entire semester.

After the icebreaker, you'll read through the expectations and philosophy of being in a PLTL group. You'll probably also establish a few rules of your own as a group, like rules concerning cell phone usage, snacks, etc. This is important so that everyone's on the same page, but not nearly as important as how closely you adhere to these rules during the session. The first few sessions are key in letting your students know how things are going to work. Since it's the first session, they'll be receptive to the different problem solving strategies because it's all new to them. Also, be strict with yourself about sticking to the PLTL philosophy. Some students may attempt to test out the waters to figure out if you'll

be a pushover about the rules. Don't let them get to you. Another part of setting the environment is establishing that it should be friendly. I literally told my group, "We're all friends here." I explained to them that this means everyone should feel comfortable asking questions and contributing thoughts.

The most important part of all though, is to have fun! You're more than prepared. Be friendly, really make the effort to get to know your group, and things should go just fine. Best of luck!

Preparing for the Arena

Tribute #12: Maya Ladenheim

Congratulations on becoming a PLTL leader! Although the thought of recalling Gen Chem topics such as photon flux, particle in a box, and molecular orbital theory may seem like an impossible task, this information will come back surprisingly easy with a little review. As nervous as you may feel now with enough preparation, a positive mindset, and some confidence, you will become an excellent PLTL leader by the end of the semester.

During the first session, it is crucial to set the appropriate tone which you want future PLTL sessions to follow. Starting off the session with an icebreaker is a great way to establish a friendly, open environment. One of the characteristics that sets PLTL apart from other mentoring groups is the strong emphasis on collaboration among all students. Having students share basic information such as their name, where they're from, what dorm they live in, and a favorite tv show, helps them to feel comfortable with one another. By establishing a welcoming atmosphere that encourages collaboration right from the start, you will pave the way for students to voice their ideas and concerns in future PLTLs. The more connected students feel to one another, the better they will work together and the more enjoyable and successful PLTL will be.

Another key aspect of the first PLTL session is establishing the ground rules. Although the concepts of scribe, round-robin, small group, and pairs may seem obvious to you after completing a year of PLTL, to your students, these are new ideas. Make sure to explain each type of learning strategy at the start of every problem. By setting clear expectations in the beginning, you will help prevent problems from arising in later sessions once students are more comfortable and attempt to stray from the set PLTL guidelines. I found it especially useful to remind students that these rules will help them to get the most benefit out of PLTL, which is the reason they enrolled in the first place.

One thing that my own PLTL leader did at the beginning of my first PLTL freshman year was to share his experience in Gen Chem. I found this small blurb about his initial struggles, study methods, and eventual success in the course very reassuring. By sharing your own experiences with your

students, you become much more relatable to them. Showing your students that succeeding in Gen Chem is achievable with hard work will encourage them to keep trying, even if initially everything does not come naturally to them. It will also make you seem less intimidating, which will make students more likely to ask questions during later PLTL sessions.

Finally, the most important piece of advice I can leave you is to have confidence in yourself. Each of you was selected because you demonstrated excellence in Gen Chem and the potential to be an amazing leader. No one expects you to lead every session flawlessly or to know every miniscule bit of chemistry knowledge. Serving as a PLTL leader is about promoting discussions that encourage students to develop a more thorough understanding of challenging topics and to form stronger critical thinking skills—not to provide them with answers. As long as you have confidence in your abilities as a leader, your group will respect you and look up to you even if you are not perfect.

A Cornucopia of Food and Knowledge
By Kerrin Sunshine

When you walk into your designated PLTL room for the first session you will undoubtedly be nervous and worried about whether your students will like you, respect you and find you helpful to their overall study of chemistry. You will have your own set of expectations of how the semester will go. Your nervous mind has probably concocted a well thought out plan of how each session will run. But what's the problem in your plan? The problem in your plan is that the students have their own expectations of how the semester will go! They see you as a cornucopia of chemistry knowledge and an unlimited source of yummy afternoon snacks. This isn't to say that their expectations are wrong or that yours are either. But the first day is the perfect time to make sure that those expectations line up.

First off, there is the matter of the icebreaker. It sets the tone for who you are and how you like to run your session. If you think of yourself as a crazy, outgoing person, find an icebreaker that reflects that. If you are more of a curl-up-in-bed-and-read-a-book type of person that you might want to just have them go around and say their names and their favorite book. I found it was a good idea to have them move around, or at least stand up, in the icebreaker so that the students are introduced to the fact that they might have to move around for groups and different activities.

Actually read through the PLTL guidelines, I promise it is not a waste of time as it is good to make sure everyone knows exactly what they signed up for. Then establish some ground rules that articulate what you are there for (for example that you are a facilitator, not a walking book of answers) and what is expected of everyone in terms of participation and general respectfulness.

Finally we have come to the topic of food. Absolutely bring food the first day!! It puts a smile on everyone's face (especially the hungry students) and can give a surge of energy when people are lagging. In fact, food is great to have every session. But if you don't want to bring it every session, change the expectations of the students and ask them to switch off who brings food every time, they will probably be more than willing!

No matter what happens the first day, whether it all goes smoothly or there are a few hiccups here and there or you feel like it was a catastrophic mess, just be enthusiastic and welcoming and you will establish an atmosphere that will allow you to work out all the kinks in future sessions.

First Day- “May the Group be Even in Your Favor”
By Joash Suryavanshi

First, I believe congratulations are in order. You are officially a PLTL leader! You struggled through the grueling curriculum of introductory chemistry, attended help sessions that seemed to last forever, worked through problem sets that seemed more like Latin than chemistry, and passed with flying colors. For that I say, “you go kid!”. Yet, you are still nervous about this new responsibility of actually leading PLTL session. What if one of your students asks you a question you can't answer? What if you can't keep you students focused on the problem set or can't break them out of their shells?

Don't worry, all new leaders have those first session jitters. It’s completely normal. However, there are some things that you can do to help you prepare for your sessions. The first and most important thing to do during the first session is to crack open the shells of all of your students. This is done with the infamous ice breaker! Pick a funny and new ice breaker that will hopefully make the students laugh and come crawling out of their shells. Don't be afraid to take your time with preliminary introductions; the first problem set of the semester is usually very short, giving you lots of time to get acquainted with your students. Bringing food is also very good idea, because what college student doesn't respond well to free food?

Another thing to address very early on in the first session is the ground rules for your PLTL. Read out all of the PLTL philosophy to the students and make it very clear that you are not able to give out answers to the students, no matter how many times they ask. Make it clear that the students are only allowed to miss two sessions and that a third absence will result in them being taken out of the PLTL program. Run through how you want each problem solving strategy to work and other rules you believe to be relevant, such as what time PLTL's will start and how many times a student can be late before it counts as an absence. Although you can change rules over the course of the semester, setting ground

rules early will makes sessions run smoother in the future.

Lastly I will leave you with the tip to stay relaxed. Don't worry if you don't know an answer to something. You aren't expected to know all the answers, only to guide your students in the right direction so they can think for themselves and find the answers together. Don't worry about losing control of your group of getting them to speak up. Be confident and friendly, and most of all, just be you. You were chosen to be a leader for a reason, so stay positive and I know you will have a great session. It is time for you to be the kid on fire.

PLTL—From the Beginning
By Rahul Aggarwal

No one starts as an expert. Developing a successful PLTL requires a lot of preparation and a broad variety of knowledge. As a PLTL leader, you have great potential to positively impact many students. This, however, must start from a base and the intention of this guide is to help you in successfully start as a PLTL leader.

First of all, PLTL leaders tend to consider some sort of pre-session preparation. One task can include relooking at SAM lecture slides to get an idea of potential different tactics to approach the session with. Another useful tip is to go through the PLTL problem set for that weekend to continue improving your familiarity with the problems. Also, as a big part of PLTL is facilitating students to be able to make deep connections, you can look through the interrogative assignments. I personally have tried to match PLTL problem set questions with different interrogative questions. The intention of this is to be able to ask students probing questions after finishing a PLTL Problem so that students can synthesize different aspects of the problem and put them into a larger context.

Another important characteristic of PLTL is the necessity of a strong group dynamic. One medium I have used to facilitate this is to bring snacks. Students love snacks! Snacks provide a way to break the silence when you first enter the room. Surprisingly, I have found that conversations result because of the snacks. Many times people will talk about how they love this type of oreo or that this chip is the greatest. The fact that students do not expect snacks in the beginning definitely helps encourage students that PLTL is a very positive space.

Lastly, one method to improve overall group dynamics is to have nametags and prepare an ice breaker. First, nametags are an easy way for students to get to know each other's names without awkwardly always asking them over and over what their name is. Secondly, it helps you as a leader learn all the names, which you should try to do as quickly as possible (it makes facilitation a lot easier). Also,

ice breakers provide a median for students to build some familiarity with each other. Ice breakers that use each other's names or those that give an opportunity for students to introduce themselves can be extremely useful to developing familiarity amongst the students.

Once again, no one starts as an expert. The key to success is ensuring you are prepared ahead of time for your session. As a leader, you should focus on getting the students to know each other well. This allows it so students are better able to have great discussions. Through practice, you can become an expert PLTL facilitator. Good luck!

You are the LEADER!
By Michelle (Hye Soo) Chung

Congratulations on being selected as a PLTL leader! As you get ready for the semester with PLTL newly added to your schedule, you might be nervous about whether you can become a successful leader or not. It's okay to be a little concerned, but please have CONFIDENCE IN YOURSELF! You are chosen to be a PLTL leader because you have shown enough passion and knowledge in chemistry. There is absolutely no reason to panic. In case you are still unsure about what you should do to lead your sessions better, here are some tips.

Establish some rules at the beginning of the semester that both you and your students promise to abide by. For example, ask your students whether they want to take turns bringing snacks or not. This might seem insignificant, but almost nothing else can bring energy to group discussions as well as snacks do. Also, talk about what you and your students want to do about the use of cell phones. Checking messages or going on Facebook could disrupt the discussions among your students. You could set aside five minutes for the students to check their phones and take a break from the two hours of chemistry. Likewise, ask your students if there are any other rules they want to set before proceeding with the sessions.

During the first few weeks, your students are probably going to turn to you whenever they run into problems they can't solve. They look up to you as their chemistry role model, so they expect you to be able to come up with answers to their questions immediately. However, remember your job is to facilitate the discussion, not to teach chemistry. Remind your students that you are never going to provide them with direct answers. Your students are going to be frustrated at first, but try your best to stay out of discussions. If asked a question, rephrase it and redirect it toward your students. As tough as it can be, it will help your students develop confidence in their answers and succeed in GenChem.

Although you don't have to answer your students' questions directly, you still have to be ready. You need to review your notes and know what is going on prior to each session. When your students see you struggling to understand or to explain a concept in PLTL packet, they will know instantly that you have no idea what is going on. Their trust in you will fall immediately and you will realize that it is much more difficult for you to facilitate the discussion once your students have lost confidence in you.

Most importantly, relate yourself to your students. Tell them about your experiences as a freshman two or three years ago. When your students come back to you with outstanding results, congratulate them and tell them to keep up the work. When your students come back with unflattering results, however, tell them honestly about how you felt when your exam result was lower than what you had expected. Let them know that you know exactly how they feel. Then, encourage them by telling them about how you were still able to succeed in Gen Chem and to complete the course with satisfying results.

There are so many other pieces of advice that I can give, but nothing can be better than learning through experiences. I am sure that once you get to know your PLTL group, you will get a better sense of how to run your sessions. Get ready! Be excited! Good luck!

Your Students…Friend or Foe?
By Dan Cohen

So this is it, Training for the Arena where you will do battle (or more likely form alliances) with your Peer Mentoring or Peer Led Team Learning group. Hopefully you have been having a great time as a newly minted peer leader and I hope that you are getting to know your students a little better. Now, however, you should start thinking about how you want to run your session and how that role defines your interactions with your students.

I know this sounds daunting at first, but the first step here is to be yourself in your sessions. If, like my case, this involves telling a couple bad jokes at my expense, it is totally fine and might be helpful in relaxing the atmosphere of the group. However, be wary of singling any of your students out, as it could affect how they interact with you as a leader and with the rest of the group.

Of course, this is all well and good, but now that you have a couple sessions under your belt you have to decide how you are going to conduct your sessions. If you are a Peer Led Team Learning leader, you should really think about *why* you have been instructed to follow the PLTL guidelines and techniques. They are in place to make sure that there is a measure of consistency in the group experience, and to encourage the group to come to its own answers, not simply the ones that the leader says are correct. What the dilemma will boil down to in the first couple of sessions is whether or not to give answers to the group. It will be very tempting to do this, but as a PLTL Leader you should make an effort to resist the temptation to tell them the right and wrong answers. You have to hold back and let them struggle a little bit, even though it might be a little painful and awkward to watch them puzzle through a problem when you could easily answer their question.

This has implications for Peer Mentoring as well. In Peer Mentoring, you will be empowered to tell them the answers. This is the key difference between PLTL and Peer Mentoring. However, just because you can doesn't mean you *should*. What I mean is that you should be careful with giving out the answers because the students can quickly lose the focus on the problem solving and instead focus on just obtaining the answers from you. It is important to help the students focus on the understanding of the problem and how to solve it rather than just how to obtain an answer with the least amount of effort. You can do this by constantly asking probing questions that try to get a student to justify their

answer. Or, you can give a student an answer to a problem that they had been struggling with and ask them to explain why.

To help students get a better understanding of the concepts in General Chemistry, you might want to have the group make a list of concepts and equations every week before doing practice problems. As you go through the concepts, try to explain their significance to the questions that might come up that week and encourage the group to do the majority of the explaining.

Lastly, to prepare for the arena, you really have to "prepare for the arena". As the semester wears on it will become increasingly important that you review the week's material and actively try and solve some of the problems that you might want to ask to the group in your session. Try to at least look over the TA notes and review the recitation notes before your session. It is pretty easy to find the time to do this, just use one of the awkward breaks between classes once or twice a week and you will be set.

Lastly, you can help your students do well in General Chemistry by enabling them to approach the problems like a college student instead of a high school student. Keep this in mind and you are completely set! Have fun with it!

By Margery Gang

Congratulations on surviving your first session! No doubt you were heavily armed with some delicious snacks and funny icebreakers, and hopefully the students laughed at your periodic use of chemistry jokes. Now that you have your first session behind you, it is important to self-reflect and think about your own role as a peer mentor.

Often, the world of PLTL can seem like an impossible juggling act. As a peer mentor, you must uphold the PLTL philosophy but also don't want the students to walk out of your session with the wrong answers all the time. You want them to enjoy going to PLTL, but not so much that your group socializes instead of working on the problem set.

One of the most important things to establish early on is a positive sense of community within your PLTL group. This, of course, started with your first session, where you (hopefully) learned everybody's names. But just as importantly, you also need to make sure that they know each other's names as well, so that when your group is doing Round Robin, students don't awkwardly call on "that girl in the red shirt." You want your group to feel comfortable with each other and that starts with you, the peer leader.

For PLTL, it's the little things that count the most. Building a positive environment for your students can really be as simple as knowing names, or saying "hello" to your students when you see them around campus and being friendly/encouraging during sessions. Maybe start off each session with a silly ice-breaker-esque question. I started incorporating games into my sessions, having the students do a quick rock-paper-scissors game or separating them by their answers to "Would you rather be a sheet ghost or a pumpkin for Halloween" to determine groups. Do whatever feels natural to you—be goofy during sessions, send them inspirational pictures of cats studying during their exam seasons, bake them cookies after their midterm exams, etc. Make your peer sessions into something that the students enjoy coming to!

Another important aspect of being a PLTL leader is the PLTL philosophy. To the students in your PLTL group, you seem eons older and wiser and they will often look to you as an answer booklet. In the first few sessions, whenever my students finished working through a question, they would all turn to look to me to see if "they did the question right." If you have a good poker face, use it. Emphasize your role as a group learning facilitator and not a tutor/teacher. I quickly swayed my students away from viewing me as an answer booklet. Whenever students asked me a yes/no question looking for an answer, I turned their question around and asked it to the group. If my students had no idea how to start thinking about a problem, I asked a few open-ended questions to seed discussion.

Ultimately, your role should be to help your students help themselves. Ask them to look in their notes and underscore the wide excess of help available to them: professor's office hours, RPM office hours, etc. The most important take-away from PLTL for students should not be knowing the Schrodinger's equation or how to solve PIB questions, but rather should be a gain of academic self-confidence. Always finish a problem set question not with an answer but with another question: "how does everyone feel about this question? Is everyone comfortable with moving on?" If you teach your students to be confident in their problem solving abilities, by the end of the semester, you should get an overwhelming "yes" to that question.

Good luck with your sessions, and as always, may the chemistry PLTL games be ever in your favor.

Archery Training!?
No…. Just Problem Solving!
By Matthew Katz

As a Chemistry PLTL leader, you have been tasked with a unique role at Washington University. Anybody who does decently well in a course can be a tutor, and regurgitate course material back to students, essentially doing the problem solving for them. Your role extends well beyond the role of an ordinary tutor: you must be a coach and mentor for your students. I know that this may sound daunting… after all, you're most likely making the transition from chemistry student to chemistry mentor in a period of about four months! Fear not, as every PLTL leader that you see at PAM underwent the same transition without much issue.

Shifting your mindset to that of a PLTL mentor is the first task that you want to prepare yourself for. Remember the philosophy behind PLTL; the students are there to learn and discuss concepts on their own, not to hear the concepts being explained by a leader. They must be trained to think independently of a teacher or TA and synthesize logical problem solving steps on their own. At the end of the day, this is the only way that they can perform well on quizzes and exams. I know how tempting it can be to lead your group through a problem that you find easy or remember from your PLTL a year prior, but the students will not gain any skills to use when they must perform in the arena (aka their testing rooms).

Not only must YOU buy into the idea that, as a leader, you will not give out answers, but your students must buy in as well. This is why I made the decision to carefully read aloud the PLTL philosophy to my students during our first session, emphasizing and thoroughly explaining the part that discusses mentor involvement in solving problems and providing answers. The students must come to expect, from the very first session until the end of the semester, that you will not be there to guide them through tough problems, and emphatically reinforcing this during the first session is very helpful in achieving this.

Now that it's been established that you are not there to solve problems for the students, you may be wondering more about how you will go about effectively mentoring the students in your group. There are a number of ideas you want to keep in mind:

- Use open-ended questions. Get your students thinking about the concepts from the notes that they've taken. I remember being amazed at how quickly the students could make sense of a tough problem after I presented an open-ended question to help them target their attention to a particular concept. The goal is to get your students talking; once they begin discussing a concept, at least one of the students will inevitably find their way onto the right track for solving the problem, and will be eager to explain the connection that they made to the rest of the students.
- Take advantage of the interrogative assignments that Dr. Daschbach makes available before each session. For a leader that is unsure how to guide his or her students without dropping large hints or giving away problem solving steps, the interrogative questions can be an excellent way to get your students on the right track without giving away too much.
- Strictly enforce the rule that students must ask their conceptual questions to each other, not to the leader. The goal is for your students to be able to tackle a conceptual issue without any interference from the leader, so from the first meeting on, you should redirect any conceptual questions right back to the students, so that they become conditioned not to expect an answer from you. By enforcing this policy early in the semester, my students learned very quickly to ask their conceptual questions to each other first, not me.

Finally, remember to prepare before your session!!! Even though you're not doing the conceptual explaining during the PLTL session, you will be ill equipped to ask probing, open-ended questions if you don't even know what you're probing for! A couple of minutes a week is all it takes to review your class notes for the impending session, and refresh yourself on the lessons of the Oil Drop Experiment, the wave function drawing process, or the electron filling rules. As long as you are prepared, you will be equipped to mentor your students for their showdown against the first exam.

Mentoring Students:
It Doesn't End When You Leave The Arena
By Aileen Ren

Freshmen students still have a lot to learn about college when you first meet them in PLTL. Often times, they don't realize that they don't *leave* school when they walk out of class, finish their lab, or leave recitation. The professor only presents the material in class, but it is ultimately the student that has to put in the time and the effort to learn it. In order to do well, studying is a far more intensive process and cramming doesn't work the same way it does in high school. As a mentor, it is both important to remember that your students are going through this transition and to encourage them throughout the semester.

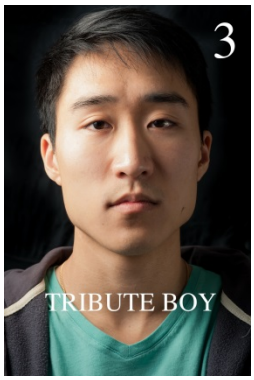
PLTL is an extremely helpful way for students to develop their reasoning and critical thinking skills for not only chemistry but other subjects as well. Keep in mind that the goal of each session is NOT to finish the problem set packet or even get all the problems correct. It is *how* they arrived at answer and not *what* the answer is that should be the focus of how you run your sessions. Ask them to show their work and to explain their logic even when It is easy to lose sight of the larger picture when the only time you see your PLTL kids will be two hours once a week and all they want to do is finish the problem set. Initially, your role may be more of a facilitator in guiding the discussions. However, as helpful as you might be, the goal of the sessions should be for them, not you, to start asking the probing questions. Ideally, the session should be able to run without you.

Sometimes it may be difficult not to give them the right answer and let them struggle. I personally found it very difficult to let them walk away from the session with a wrong answer, but I had to remind myself that I was not their only resource; they have their Residential Peer Mentors, TA office hours, professor help sessions, Cornerstone tutors, etc. all at their disposal. Giving them the correct answers is not helpful if they don't understand the concepts behind the question. If that were the case, an answer key would be released with the PLTL problems. In certain situations when I saw people having difficulties

with concepts and asking me for answers, I told them to try to figure the problems on their own first and I would touch base with them at next week's session. By the time next week came around, they almost always had their questions resolved either by talking with a friend or figuring it out on their own. This gave me a peace of mind that I wasn't just leaving them hanging.

Many students falsely believe that all the answers are going to be given in lecture. As you probably know from experience, the exam doesn't test simply on what you remember from the notes, but will have questions that test how you apply the concepts you learned and practiced. Encourage them to start early and to seek help if they need it. I believe that everyone can succeed in Gen Chem if he or she puts in the time and effort. After they leave the PLTL session, there isn't that much you can do for them, which is why teaching them good problem solving strategies in the session is so important. Although the problems and concepts may not stick with them past the semester, hopefully they will learn valuable strategies to help them through the rest of their college career.

A final word of advice is that you are one of their role models. Even if you have friends in your session, remember that you should carry yourself the way you want to be seen both in and outside of the section. We are all a team and we want them to succeed!



Tributes Just Missing Not Dead Right?
By Clarence Chu

As you're reading this, it's probably that time in the games when most of your tributes have gone missing or are giving up. Although it may seem impossible to recover from the current series of events and you may want to give up, now is not that time! Remember it is your job as a leader to make sure your tributes put up a good show. So here are a couple of things you can do to improve the fighting spirit of your tributes.

The first and most important step is to remember that you are their mentor and leader. You have previously participated in the Gen Chem Games and have experienced this slump before. It may be difficult to remember those days since they were so horrific, but it will be invaluable to your tributes to have advice from somebody that has survived the games. Remind your tributes that although they may be unmotivated or have other commitments, the best way to do well in the games is to continue attending lectures, doing the problem sets and of course coming to your PLTL sessions. Your tributes may be doubtful of your advice, but you have to reinforce the idea that as a mentor you know best.

As their mentor you have to lead by example. It is easy to fall into the habit of living the lazy victor's life, where you simply relax and do nothing. However, if your tributes get the impression that their mentor is not prepared for the sessions then they are less likely to be prepared also. Remember that being prepared for sessions means that you have looked over the packets and have some idea of where issues may arise. Although you may have potential answers for the problems, do not succumb to the trap of supplying those answers to the tributes. The tributes must learn to solve those problems by working together. If you as their mentor supply them with the answers, then your tributes will be ill prepared for the real arena. Do not be overly concerned if your tributes continually pester you with demands for answers or struggle because there is a simple solution. Remind them of the PLTL philosophy that they agreed to when they first decided to start coming to sessions. The tributes need to

understand that they have been given an opportunity to do well in the arena, but they need to put in the effort themselves. Therefore it is important that as a mentor you make sure they don't slack off.

Last but not least, make sure you keep the sessions exciting. We all know that working hard is a pain, but there's no reason to make it more painful by also boring your tributes. There are a few good ways to keep your tributes motivated and excited. Make sure your tributes remain healthy and well fed. That may involve bringing snacks on your own or getting fellow tributes to gather snacks for the others. Either way food is an easy way to keep them happy and coming back. Another tactic would be to let your tributes socialize. It may seem counterintuitive for a productive session, but tributes are often stressed out. The best way to keep them focused is to give them some down time and allow them to relax before they work. However, it is your job as the leader, to make sure there isn't too much to socializing, which is only something you can decide. Also, try and bring back some of the fun things you did at the beginning of the semester. The icebreakers and games may have been a great way to start the semester, but that doesn't mean they had to be reserved only for the beginning. Don't be afraid to change up the session; it might be what your tributes need to start feeling motivated again.

From one mentor to another, don't forget that your role is to give your tributes the skills to succeed in the arena. You have the necessary experience and skills to fulfill your role successfully, so go out there and have an enjoyable Gen Chem Games.

Overcoming the Mid-Semester Slump
By Alekses Clifton

Around this time in the semester you may start to notice a lack of enthusiasm from your students and perhaps even yourself. This general shortage of energy is known as the mid-semester slump and happens to even the best of us. Don't worry though because with a little preparation and a positive attitude a peer leader can pull their group out of this unfortunate rut.

A student going through the mid-semester slump shows tell-tale signs such as a lack of preparation for the mentoring or PLTL session potentially caused by not attending lecture or not doing the problem sets beforehand. A good leader will encourage the students to come prepared and show the importance of staying on top of their studies, especially general chemistry. A good leader should not only offer chemistry help but also advise students on how to balance school and extracurricular activities. Although no one wants to receive a nagging lecture, freshman often appreciate advice on how to handle different aspects of college life. Help your students work through their low motivation levels and stay caught up with their class work. One way to keep your students accountable is to send out an email before each session reminding them of what they should complete before the session. Often a weekly email is enough to keep students engaged in a large class setting where they might not feel a personal connection to the class. One role of a peer mentor is to build a relationship with the students to help ease the transition into a college level course. Show them that you care and that you will help them get through General Chemistry and their freshman year.

Your students may not be the only ones experiencing the mid-semester slump. As a student yourself you probably are also dealing with an intense schedule between your schoolwork, club activities, and part-time jobs. Preparing for your session can quickly drop in priority on your to-do-list but it remains essential that you also stay caught up with the material. When you accepted the role as a peer mentor or PLTL leader you agreed to come prepared to each session and ready and willing to help your students. When a leader shows up the session disorganized and not knowing the information, it

sends the message to the students that they also can come without preparing themselves. If no one is ready to work, it becomes very difficult for the group to progress through the week's material and often everyone becomes frustrated by the end of the session. By simply reviewing the week's notes and looking over the recitation packet ahead of time, peer mentors can confidently run their sessions and ensure their students benefit from the meeting.

Changing the way your session is run can also help decrease the effects of the mid-semester slump. In the beginning of the semester I often was the only one writing on the board as my group worked through problems, but towards the middle of the semester I encouraged my students to write on the board and show their thought processes to each other. This technique provided all the students with multiple ways to learn the information and it was also nice for them to have the opportunity to explain the different concepts to each other. Also as the leader it is your responsibility to maintain a high energy level and a positive attitude in your session. Instead of complaining about your own large workload, you should encourage them by setting a good example. Actions speak louder than words and students will be more likely to follow your advice if they see you living by it.

The mid-semester slump is a challenge to work through but you have successfully navigated at least 2 of them in your collegiate career, so motivate yourself and help your students through their first college semester and you will all be surprised by how quickly the semester goes by.

Stay alive... but more importantly, just stay awake
Sharon Jiang

So, it's been a few weeks and PLTL has become a part of your routine on the weekends. As the semester progresses, it's becoming easy for you as well as your students to treat PLTL as just another thing to check off your list in the midst of your busy lives. As mid-semester approaches, everyone tends to slow down, and in a sense, get lazy. Students may stop showing up, going to lecture, and might lose the motivation to discuss the chemistry topics; in fact, *you* might even start losing the motivation to really prepare for PLTL and give it your all. When this happens, it is your job as a leader to get everyone back together and determined to discuss concepts.

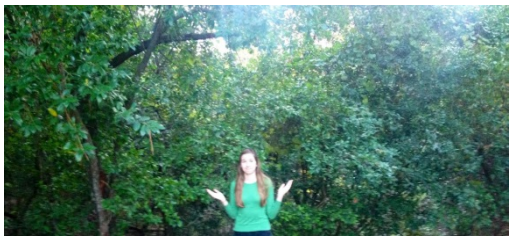
If students start showing up unprepared (are not caught up on lectures or problem sets), it's important to stay encouraging but remind them that if they don't start catching up now, they will keep falling behind and feel less and less confident about their abilities in chemistry just because they procrastinated learning everything! It might also be helpful to comment on your own experiences with either falling behind in a class or not attending lectures on time, since that way they will feel like they can still catch up to the class and succeed; some students fall so far behind that they don't even think it is possible to do well in the class anymore. At PLTL, ask them very basic questions to ease them into the topics and help them gain confidence in their abilities. You could also ask them to summarize the general topics that the other students brought up. Make sure you are helping these students catch up, instead of fall more behind. While they are at PLTL, they will hopefully also realize that they are not contributing as much as they could and will try to be more prepared for the next week.

There are also always those students who stop showing up to PLTL and you end up never seeing them again-- shoot them an email! Ask them how they are doing, and remind them of how helpful it is to thoroughly discuss the chemistry topics with peers while improving critical thinking skills. It's easy to give up at the time, but come finals they will really appreciate the weekly discussions in PLTL!

Lastly and most importantly, be prepared as leader. The best thing that you can do for your students is to prepare yourself well with the topics of the week, in PAM and on your own time. It can be difficult to recall some of the topics at times, so keeping your old notes and problems on hand as well as being active in PAM on Fridays will really help you feel prepared at your PLTL sessions on the weekends. Take note of parts of problems that made you struggle, as they may be the same parts that the students

end up struggling with. Come up with "probing" questions and write them down on your peer leader packet so that you won't have to come up with them as your students discuss. These are really useful, especially if the students are at a loss of words or don't feel like coming up with anything to say.

Be enthusiastic and excited about being there and doing chemistry for two hours. If you aren't excited (or at least act like it), then you shouldn't expect the students to want to be there any more than you do. Encourage a comfortable and happy environment among your students, even if it means talking about a few things that are not chemistry related; students will be more likely to participate if they don't feel forced. Bring food, make jokes (or at least try to), and have a good time! If you're going to spend two hours on chemistry together every weekend, why not try and make it enjoyable?



Alone in the Forest: Where is my group?
By Meredith Rae

At the beginning of the semester, a nervous and well-prepared group of students shows up to the PLTL session, eager to learn and unsure of what to expect from the feared General Chemistry. Class is well attended, problem sets are completed in advance, and the full PLTL group is present. Midway through the semester, the mid-semester slump hits and everything changes.

The two major problems a PLTL leader must face in fighting the mid-semester slump are attendance issues and unprepared students. In terms of attendance, it's always a good idea to send a friendly reminder email to encourage the students to attend the session. With all the stress of midterms, it's easy to fall into the trap of thinking that the two hours of PLTL could be better spent doing something for another class. In the long run, even if they are stressed it is best to devote a couple hours to staying on top of the material to avoid getting behind. You can remind them of the importance of staying on top of the material in Chemistry, and how two hours spent at the session will be beneficial. It's difficult for students to believe this at the time when sleeping until 2 PM sounds far more appealing than attending a chemistry study session, but you can reassure them with your own personal experience.

Even if the students do show up, PLTL groups can often suffer from a complete lack of motivation in the middle of semester. Students go from attending class in person every day to streaming class on Blackboard, and eventually slump into skipping class altogether. This puts a big stress on the members of the group who did attend because others will rely on them completely to walk them through the problem set. As a leader, it is especially important in the middle of the semester to set a good example by being prepared for the session in order to guide a group that is struggling. It's easy to prioritize our own homework over reading over the interrogative assignments and old notes each week, but we need to remember our responsibilities as PLTL leaders. If we are unprepared, we might fail to ask meaningful leading questions or recognize when students are missing a key concept.

Obviously, you cannot control the decisions of your group, but setting a positive attitude and remaining encouraging throughout the semester will help the students stay motivated (and bringing food never hurts). Remember that you are responsible for leading your group, and together you can make it through the mid-semester slump!

Surging in the Middle
By Vince Stephen

Congratulations! You've made it through your first few PLTL sessions and any awkward introductions. Your students have learned the basics of the PLTL philosophy and the collaborative learning strategies. Surely the rest of the semester will be a piece of cake now that you can call each student by his or her actual name. Maybe now you can finally start reading for orgo during your sessions while your students take care of the rest. You've got the boulder moving, so now it's just time to watch it roll down the hill, right?

Not quite. Despite what you might imagine, the middle of the semester is not your time to relax. You might have done an absolutely fantastic job in the beginning of the semester, but no matter how awesome you did, you are not done yet. In fact, this might be the part of the semester that requires the most work. I'll begin with the aspect that is most under your control: yourself. The most important thing you can do is to not let up in your efforts as a leader and in preparation. Yeah, school gets tough. You've been here for at least a year, so you know that. But you probably also know nothing else lets up when school. Now, I am not trying to say PLTL is or should be some overbearing load that you carry on top of a busy school schedule and whatever other extracurricular activities you do, but it still cannot just be something you forget about except for during two hours on weekend. Furthermore, during those two hours, make sure your focus is PLTL. I know that feeling when it is Sunday and there is an orgo exam the next day, but PLTL just is not the time or the place to worry about this. Planning ahead is crucial for these situations. Find time to study or work on whatever other projects you have before PLTL, knowing that you won't have that time to work on it. I am sure you have already learned about the necessity of time management in college, so here's a chance to utilize that knowledge!

Furthermore, your continued work and interest will have an enormous impact on your students. If they can see you care, they are more likely to care. Get excited for chemistry! Personally, I found the topics get more and more interesting as the semester goes, so use that to motivate your students into caring about the Millikan's oil drop experiment and Molecular Orbital Theory. However, this leads us to the topic of your students' own mid-semester slumps. Just like you, they are beginning to experience the joy that is weekly midterms and increased stress. This can be an especially difficult problem to overcome. You will probably notice your first students begin to miss sessions and others may be behind

in class. Remind them of the importance of sticking with the program and how it not only will help them, but the others in your group. Try using your own experiences from last year to help them understand how this helped you.

Just making sure your students attend is not everything, though. In the session, you will have to focus on sticking to the roots of PLTL. Yes, by now the students should understand the basics of how each strategy works and general PLTL philosophy. But that's just it; while they get the basics, they might not just yet fully appreciate the benefits of following the guidelines. They have grown more comfortable with you now and will not feel so scared of asking you for answers, and you might not be so motivated to remain true to the ideals you stressed during the first session. Fight this feeling! Remind them (and yourself!) about why it is so important not to give answers, to make sure the scribe does not talk, and why pairs need to not work with other pairs. These are all important factors in making PLTL have the benefit it has, as you very well know. So keep up the great work! The point of this section is not to teach you anything drastically new. Rather, it is to tell you that you already know everything you need to know! It is all simply just a matter of sticking with it and putting the extra effort when you need it.

District 13? You Mean that Pile of Smoldering Rubble?
By Benjamin Yu

There comes a time in every semester when, inevitably, the work picks up and the motivation drops to record lows. What once seemed like a ~~fun~~ busy and illustrious PLTL session turns into a sudden ghost town. The students either stop showing up, or they come completely unprepared and are entirely disengaged during the session. And the slump spreads like wildfire. Even the best of your students might fall victim to this affliction. In fact, even you may feel the symptoms of this crippling epidemic.

Don't dread! Although you/your students might come to PLTL dressed in smelly, wrinkled pajamas and wear the baggy eyes of too many consecutive all-nighters (telltale signs of the slump hitting hard), there is a cure! Well, perhaps not a cure, but a treatment, at least, that might alleviate some of these symptoms.

Have you been caught up in the same routine week after week? Change it up! Certainly, no one wants to sit through the same 2 hour drab of chemistry every single Saturday or Sunday. As much fun as chemistry is, there is a point for everyone when they have had too much chemistry. Why not try and switch around the dynamic of the session? Incorporating a short 5-10 minute break halfway through the session for everyone to catch a water break or just engage in distracting conversation can go a long way to help them refocus, especially as the material becomes denser and the students' motivations are headed deeper into that downward spiral. Do you bring snacks for them? How about trying to switch up when you give them the snacks? Instead of giving them food right at the beginning, maybe give it to them towards the middle of the session to spruce things up a bit when they are getting sick of trying to understand molecular orbitals. If you don't bring your students food, or even have the students bring their own snacks (if you are on some sort of snack rotation), it might be a good change of pace to bring them a special treat once in a while (last year, certain student groups were selling donuts, pies, etc. that could be easily purchased and brought to the session).

Of course, these short term solutions are great if the students show up to the session. What about getting more students to show up? Well, emails are a great start. Whether or not you might realize it from the leader's point of view, an encouraging email, say right before a test, can really do a lot to boost their morale. It might help to build more of an emotional connection between them and PLTL, which will certainly bring them out to the sessions. Sending them occasional reminders to look over the

material before a session, or things they need to bring to a session can also get them to develop more of a vested interest in the program. This can be especially effective if you emphasize the challenging nature of that week's material (it is already hard for them, letting them know that it was also hard for you can make them feel a little more urgency in attending the session).

Another important thing is to never forget to provide positive feedback, especially when the students are hitting that slump! Did they almost get a question right? Congratulate them on a great start and ask if anyone else knows how to work out the next part of the problem. This brings us to a very important point – the PLTL environment should not only be comfortable, but also highly encouraging and positive. Do some of your students feel left out of discussions or possess personalities that clash with the rest of the group? Now would be a great time to talk to them privately and really figure out if there is something that can be changed, either attitude-wise or dynamic-wise. Alienation will not only put that student at a odds with PLTL, but will also create discomfort within the rest of the group.

The most important point, though, is to remember that you are the leader in position, but facilitator in role. Your students will look up to you, and your attitude will definitely impact the course of the session greatly! Try your best to maintain an upbeat and positive attitude! If that's not you, do your best still to create a warm and inviting forum for their discussions, chemistry-related or not. Droopy students and a hostile environment is just about the worst combination of things that can happen for your PLTL group.

And with all that in mind, I bid you a happy Gen Chem Games. May the odds be ever in your favor!

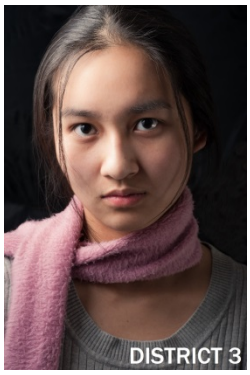
Not Just a Piece in the Game
By Saya Bery

After becoming familiar with your group dynamic, the next step is to implement the collaborative learning strategies in a way that benefits your specific group. Remind each member that they are not just another piece in the game that we call gen chem class, but rather, that they are an essential part of the PLTL group; without one person participating or following the collaborative learning strategies, the entire group falls apart. Every week is different, as exam schedules and energy levels vary every week, but overall, properly implementing the collaborative learning strategies will prove most beneficial for the group week after week.

Whenever the word “scribe” is uttered, everyone’s phones or eraser shavings or hands seem to suddenly become very interesting as all of the group members look away, hoping not to get noticed. For some reason, asking for a volunteer can be like pulling teeth for scribe, but there are several ways to avoid this situation. For one, I always made sure to offer to take notes for the scribe, so they would not feel like they were missing essential material from their notes if they volunteered. In addition, I would ask for (or call on) a different scribe each week, asking for someone who hasn’t been scribe yet. Although I did not do this in my group, some leaders pick scribes right from the get-go, to ensure that they would not have to awkwardly choose one person to go up to the board. Scribe can come in handy in the case of an overbearing or dominant student to make sure that other members of the group have an opportunity to speak up and participate. Overall, scribe is a useful collaborative learning strategy in that it gives you as the leader and the group members themselves a sense of their understanding of the concepts from class. The specialty of this collaborative strategy is the ability to transform and conform to your particular group without breaking PLTL philosophy, to suit it better to your group than to make it a chore.

The other strategies of small group and pairs are also useful in applying to your specific group. It gives you an opportunity to split up the dominant students from the quieter students, or maybe to purposely put them together. Depending on your particular group dynamic, it may be beneficial to keep these groups separated or to put them together to complement one another; it's your call. However, during these strategies, make sure you are walking around to ensure that the groups stay on task and are working together. These strategies make it easy for students to work alone or work ahead unnoticed, so periodically ask questions to keep the groups thinking and discussing, and ask each group to put a portion of the answer on the board at the end. This way, the groups can come together to discuss different processes of the approaching the answer, and everyone in the group benefits from the same knowledge shared in the group.

For me, round robin and large group were the most difficult to adapt specifically to my group. In round robin, it may be easiest to choose someone to start answering the question, and go in a circle from there, with each person contributing some information, to ensure that everybody answers and nobody feels picked on. Round robin is useful in the sense that everybody's voice gets heard, but it is a group effort to reach the answer. Large group, on the other hand, can be just the opposite, with just one person spewing out information and everyone else just writing down what is said. In this case, I recommend making a rule that nobody is allowed to write anything down (except for on the board) until the group reaches an answer. Once again, depending on the group, these techniques can be altered and manipulated within the PLTL philosophy to best benefit your sessions.



A Cornucopia of Weapons
By Emily Feng

A large part of our success in PLTL hinges upon our ability to wield the tools and strategies taught to us skillfully and effectively. Gen Chem can be intimidating, especially for new tributes. These strategies are the tools our tributes can utilize to start turning the odds in their favor. However, the strategies are only as effective as the group that uses them. It is not enough to go through motions of each learning strategy. It is equally important to align the learning strategy with each group's dynamics. By adjusting the strategies to fit each group, pairs, small group, round robin, and scribe can be the weapons our tributes use so that they may be the next victors of the Gen Chem Games.

Pairs: This is the most natural strategy for tributes to pick up. When PLTL first starts, it is nice for a group of tributes to start with pairs to gain confidence in themselves within the group. As the semester progresses, pairs is a good opportunity for tributes to get to know each other and for them to work with different learning styles. This may take some work on your part though – the natural instinct is to work with one's neighbor or friend. Assign pairs to break the tributes out of their habits and shell. Be warned, as alliances form within the group, pairs can break down into large group discussions. A quick fix is to physically separate the pairs around the room and, as always, to give a friendly reminder of the PLTL philosophy.

Small group: Again, this strategy will come more naturally to your tributes. As they warm up to each other, they will become more willing and open to working with each other. Once again, pre-existing alliances can hinder this strategy. Tributes will once again gravitate to their allies. Combat this by making premade groups. If tributes are not engaging in much discussion, try to match different learning types together in order to prompt more lively conversations. If there is a lot of discussion, but it tends to be one-sided, try grouping the quieter tributes with each other and the more dominant ones

together. Keep trying different combinations until you find some that really mesh for your group of tributes.

Round Robin: This strategy is foreign and intimidating for many tributes. However, it is an ideal choice of weapon as it forces each tribute to participate and thus strengthens each tribute's knowledge of the Gen Chem concepts. However, in order for that to happen, the tributes need to participate. This can be helped by, one, reinforcing that any little bit of information is helpful and considered a "turn," and by, two, giving the tributes examples of a turn and maybe even walking through what a successful round robin looks like.

Scribe: Scribe, perhaps, is the most difficult strategy of all, if only because it seems deceptively familiar. The urge is for the scribe to teach the rest of the tributes the question. As a result, it is imperative to make is clear from the beginning that the scribe knows nothing. Don't hesitate to remind the tributes as such during the problem and throughout the semester. Also, tributes do not often volunteer as scribe. Scribes must often be chosen from the tributes. On the rare occasion that one tribute consistently volunteers as scribe, be wary it isn't due to a desire to be the "teacher" or to hide from the group discussion. Finally, once a scribe is chosen and knows his/her proper role and yet the rest of the tributes are not discussing, round robin (popcorn style or around the table) is a helpful way to start the conversation or control a wayward group.

These are our weapons against the Gen Chem Games. Remember they are built to help our tributes become the new victors, and each tool has the flexibility to be adjusted for each group. And remember, the odds are ever in your favor.

"Thank You For Your Consideration" . . . of Collaborative Learning Strategies"
By Aakash Gandhi

> "Tomorrow they'll bring you in one by one. They'll evaluate you. This is important 'cause [sic] higher ratings will mean sponsors. This is the time to show them everything. There'll [sic] be a bow: make sure you use it…They'll start with District 1, so the two of you will go last…Make sure they remember you."
>
> *-Haymitch Abernathy, emphasizing key parts of the evaluation of tributes by the Gamemakers ("The Hunger Games" film)*

> "Tomorrow your students will file in one by one. They will be evaluating you. This is the time to set expectations for PLTL philosophy and session structure. There will be collaborative learning strategies on every problem, make sure you use it. They will start with the first problem, so make sure you take them through the review and warm-up questions. Make sure they remember you (as the PLTL leader who is committed to helping them."
>
> *-Aakash Gandhi, emphasize the key role of exercising collaborative learning strategies, especially on the first day of PLTL*

My terrible attempt at humor notwithstanding, I do believe the above pun comprises all of the challenges to collaborative learning that a new leader will face. Do not be fooled: facilitating a collaborative learning process is the hardest part of your job as a PLTL. However, as you will be reminded multiple times over the course of SAM class, the best PLTL groups is the ones where you, the leader, could leave the room for 2 hours and expect your students to be just as productive as if you were there. While this might seem unrealistic, it is the ideal that you should keep in mind when planning and leading your sessions.

There are some very basic steps you can take on the first day of PLTL to approach this goal. Take the time to establish for your group the names and purpose of each collaborative learning strategy. Ideally this should happen during the first session, when you introduce PLTL philosophy (make it a priority to do so if you have not already!). It might seem tedious, but if you do it on that first day while students are signing their PLTL contracts, they will realize that contributing and cooperating with the group is an obligation they are expected to fulfill each week. Additionally, being candid about session

structure on the first day will communicate to your group that you are organized and dedicated, which go a long way towards building strong, trusting relationships with your group.

In effect, you can think of each collaborative learning strategy as a way to prevent the common pitfalls you describe in SAM class. There is a reason why none of the collaborative learning strategies are named "Whole Group" or "Individuals." Many of the collaborative learning strategies (see "Scribe" and "Round Robin," below) are susceptible to devolving into a whole group discussion, and sometimes your students will ask to combine their "small groups" into larger groups to get through problems more quickly—you yourself might be tempted to agree with them. Fight this temptation. While PLTL is certainly a time for group discussion, even the best of sessions are rarely collaborative during "whole group" discussions. Almost always, they devolve into some combination of (1) one peer dominating the discussion, or (2) unabated squabbling matches between a couple of dominant personalities, or (3) cricket-chirping silence from a shy or unresponsive group. All of these will leave you in a tough situation as a leader, and ultimately rob precious minutes from your session as you attempt to reign in an uncooperative group.

My favorite teacher in high school wrote a single course objective on the first day of our sophomore chemistry class, and it remained there for the entirety of the course: "The learners will learn to learn for themselves." Similarly, you should avoid any situation in which your students are working on the problem set individually, without discussion. Allowing this is a disservice to your students, as it does not allow them to hear fresh perspective from yourselves and others. In my own experience, relying on the whole group or individual contributions should be used only at the end of problems to make summaries and draw conclusion after a particularly long discussion.

As a PLTL leader, you will feel a lot of pressure from your students, directly or indirectly, to get through the problem set quickly and impart as many point-scoring tips as possible. After all you, you want your students to do well on tests and quizzes throughout the course. But remember that you are first a study session facilitator, and secondly an academic mentor; "tutor" falls very low on your list of responsibilities. Remember that, in addition to reinforcing chemistry concepts, PLTL is a place for students to understand how to become independent and self-driven in their science courses. While the collaborative learning strategies may at first seem like an unnecessary obstacle, wielding them effectively will actually increase the output of your sessions.

Facilitating the Collaborative-Learning Strategies, a.k.a. How to Survive the 1st Annual Chemistry 111 PLTL (Games)

By Megan Kawasaki

By now, you have probably realized that your group of students does not appreciate the problem-solving strategies as much as you might hope. Despite how every week you stress the merits and importance of each, pairs work can tend to devolve into large group discussion, and Round Robin problems can turn into what almost seems like an individual study hall. Getting students to understand that these strategies are helpful is not the easiest of tasks, but with a little bit of pushing and some clever tactics, you can certainly get them to embrace the collaborative learning strategies. Here are some of the tips that worked for me, but feel free to tweak them in order to fit your own specific group dynamic.

Let's start with the infamous Scribe. Out of all of the problem-solving strategies, for some reason, Scribe is the most dreaded and disliked one of the bunch. Students never seem to be willing to volunteer for the job, and instead of the whole group working together and making sure that everything is on the board, one student will often take over the entire job of solving the problem. To avoid all of this, you could make one of those dominant students the scribe, which simultaneously eliminates the issue of having to ask students to volunteer and allows for easier facilitation of discussion among quieter students. You could also switch up the scribe every so often, especially for longer problems, which is a good way to encourage more active participation from the more introverted members of the group. Lastly, if all else fails, be the scribe yourself! Sometimes, it is more helpful for all students to work together on certain parts of a problem, such as those with long, complex calculations, rather than having a student scribe write up the final answers on the board. You can step in to make sure that everyone is getting all of the work down and understands what is going on.

The other strategy that students do not quite embrace is Round Robin. The major trouble with this one is that work tends to be conducted in a very linear and obvious fashion, which makes it very easy for people to work ahead or to zone out after they have already spoken since they know their turn

is done. To keep things interesting, try it in a popcorn style: have people call randomly on others to provide the next piece of information. This allows for everyone to take part in discussion while also ensuring that each student is keeping pace with the rest of the group, as they will have no idea when they might be called on. If students are at a loss for words at their turn, be encouraging and let them know that they can offer anything, whether it's a concept from their notes, a question about the problem, an equation, or even if they just want to write something up on the board. Make sure that everyone feels comfortable participating and is on the same page, and Round Robin should not be too much of an issue.

Finally, we come to pairs and small groups, which are the two easiest to facilitate well and are quite important because they do encourage contributions from shyer students, who might find speaking in front of the whole group more difficult. To really get conversation going, try assigning partners and having students move around the room. If you tell students to pair up with the person next to them for each of these problems, chances are that that will devolve quickly into solo work. Making the pairs yourself, whether by counting people off so that they work with the person with the same number as them or by calling out names at random, leads to far better collaboration. Plus, by having them physically change seats in order to meet with their assigned partner or group, you can break up any lull in the group dynamic. Sitting for the entirety of the two-hour session is undoubtedly tiresome, and this is an easy way to sneak in a little bit of energy into your group.

I hope that you've found a couple of these strategies useful for your own sessions. If anything, the most crucial thing you could do is to get students in the habit of working together right from the beginning. Build up a solid routine of consistent and effective usage of the strategies, and that will set a strong tone for the rest of the semester. If you haven't quite gotten there yet, don't worry! Always keep in mind that getting your students to collaborate isn't an impossibility. All it takes is just a little bit of creativity, adaptability, and optimism!

Don't Leave Your Tributes Hanging!
Sandhya Ramaswamy

Most students join PLTL purely to help them perform better in the course, and to practice solving problems and familiarize themselves with concepts. And while these are all definitely goals of PLTL, there is another crucial aim of the program which many participants overlook: to help students learn how to work with peers and become comfortable with collaboration. The collaborative learning strategies, when implemented correctly, can do just that, and will also facilitate higher-level thinking and a deeper understanding of the problems.

Scribe problems can be a great way to facilitate large-group discussion and conceptual debates if run properly. But if you don't stay on your guard and keep your students alert and talking, these problems can descend into silence and individual work. One problem I faced during the first few weeks of PLTL was that the same two or three students would always have to volunteer for scribe, as no one else wanted to. So I started asking people who hadn't gone to the board yet to be the scribe, and after a few sessions, the students who I had to previously call out started volunteering themselves. So don't be afraid to point out students to be scribe, because it's important that the scribe is switched up. Another recurring problem I faced was a lack of conversation. The scribe would go up to the board and wait for direction regarding what to write from the group, as he/she isn't allowed to talk. Yet the other students would be busy analyzing the problem individually or in small groups, and would forget to vocalize their trains of thought or steps to the scribe, and left the scribe hanging. For a scribe problem to be effective, it is crucial to ensure that the students are talking through the problem aloud and to facilitate entire group discussion rather than individual or small group work. The rest of the group *must* be talking to the scribe, or else the entire purpose of this learning strategy is defeated. The point of scribe is to have the

whole group absorb, discuss, and visually experience the solving of a problem, step-by-step, *together*, and to make sure every student's voice is heard.

Round-robin problems can be a great way to sort of "check in" on every student's understanding, and make sure that each student contributes at least one thing to a problem. Don't be afraid to direct questions, regarding the next step or just clarification of a concept, and call on students to contribute next. Sometimes just going around in a circle can get monotonous, so it's good to mix it up! And to make sure that students are covering and discussing key concepts while solving the problem, it's helpful to ask probing questions, and ask the students to explain *why* they are doing each step or why the answer is such. By requesting the students to support their answers, they are forced to analyze concepts out loud to back themselves up, and this helps form a deeper understanding of the material.

Small group and pair problems are good strategies to encourage students to learn from each other. That being said, it's important to make sure that each student in the group or pair is contributing, and that one student isn't just leading the problem. For pair problems, be careful to avoid pairing dominant students with quieter students a lot, because this can often lead to one student solving the problem for the group. While it is sometimes unavoidable, try not to let it happen too much. Another issue often faced with small groups or pairs problems is inter-conversation between groups, and the problem turning into a "large-group" problem. One way to help avoid this is to have the groups physically separate from each other, and maybe move to different corners or areas of the room. As long as students are sticking to their groups and contributing to the problem-solving process, the strategy will prove to be highly effective.

The problem-solving strategies are designed to encourage critical thinking and analysis through group work. By hearing what their peers have to say, students can gain different perspectives of the problem and understand the material on a new, deeper level. If you remind your students of this and help them implement the collaborative learning strategies correctly, your students will stand to gain much knowledge, regarding both chemistry and group-work, from this experience.

CLS Cornucopia

By Michelle Recto

So you've made it through the first session. The hardest part is over. Congratulations! Now it's time to get to business. You all were in PLTL once so you know what the collaborative learning strategies are: Round Robin, Scribe, Small Groups, and Pairs. Each one of these methods is useful in its own way and appeals to different students with their own individual learning style. But WHY are they useful and HOW should you implement them? Well never fear. After reading this section of the SAM book, you'll be a CLS boss.

Round Robin: In order for this method to be most successful, I suggest you move sequentially around the table so that each member can contribute to the discussion of the problem at hand. I would also recommend that you stress the importance of everyone contributing something, anything, when it's their turn instead of passing, even if what they say is not exactly correct. You should make it clear that it is okay to make mistakes in PLTL because it's through mistakes that students learn best. In addition, if necessary, don't be afraid to politely cut a student off if you feel they're starting to take over the entire question instead of only contributing a single piece of information. By allowing each student to have an equal chance to contribute to the discussion, quiet/dominant student personalities are forced to recede, thus creating a more effective collaborative environment.

Scribe: I find that the best way to execute this CLS is by either assigning a dominant student to be scribe in order to allow less confident students to have an opportunity to speak without being shut down by an overly confident student, or by serving as scribe yourself on a particularly long and/or difficult problem so that all students can write down everything they need to on their own sheets as the problem is being solved. If the problem is long and you have multiple dominant students, feel free to switch them out so

that one student does not feel singled out as the member that's always made to be quiet. One of the best ways I've found to keep the conversation running smoothly is to run scribe problems in a similar manner as round robin, with each student contribute any relevant information or equation. While it may sometimes take a lot of encouraging and probing questions as well as a couple of minutes of complete silence in order to get a student to speak, the key is to wait it out because eventually someone will say something.

Small Groups or Pairs: My biggest advice to you on these last two strategies is to keep switching students up. Continuously change the groupings/pairs so that students get to interact with ALL their peers. The point of PLTL is to foster a community of learning among all of the students, not just some. Small groups and pairs are useful methods because they both allow for a more individualized focus where each student is required to display their strengths and weaknesses on the problem, whereas in scribe and round robin students can, simply by chance, avoid talking about problems of which they have an insecure understanding. After each small group/pair has finished the problem, bring the entire group back together in order to discuss the answer and have the students come to a consensus on what the correct answer is if there happen to be discrepancies among different groups'/pairs' solutions.

For all of these collaborative-learning strategies, make sure that ALL work is written on the board and discussed afterwards. Before moving on to the next problem, also double check that all students have an understanding of the solution so that nobody is left confused. If your students are struggling with a particular problem for an extended period of time, maybe switch to a different method according to what you think will lead your students to an answer. Ultimately YOU are the leader and can decide what you think is best for your group. Be confident and good luck!

Round Robin: the Unexpected Champion of Collaborative Learning Strategies
By Alexandra Rhodes

Before I started leading my PLTL group, I was worried about a number of things regarding PLTL. One of the most daunting aspects for me was trying to figure out how to get my group to follow the collaborative-learning strategies without resenting the PLTL philosophy and me as their leader. For my first PLTL session, I decided to be honest with my students and tell them that the learning strategies were not the most interesting, but we use them for a good reason, and we were going to stick by them. During my first session, I established that we were going to follow the collaborative-learning strategies by the book. Once the students realized that each question would follow a learning strategy, they stopped complaining about them and became used to the fact that this was how our sessions would be run.

Each PLTL question has a suggested collaborative-learning strategy associated with it, but sometimes it is better for your group if you choose to use a different collaborative-learning strategy. In general, the collaborative-learning strategies are used to push your students to think and also to get all of your students to participate. Each collaborative-learning strategy has its strengths and weaknesses. One of the most notorious collaborative-learning strategies, aside from scribe, is round robin. Round robin requires a lot of work on your part as the PLTL leader to make sure it does not devolve into large group. However, it can is a very valuable learning strategy. I've found that round robin is especially useful if you have a quiet group that doesn't want to participate. It's also great if you have students that are not very confident in their answers. Because round robin only requires each student to offer one piece of information, it creates less pressure on each student. Conversely, if you have one very dominant student, round robin can be a way to hear from all members of your group, and will give the more quiet students a chance to think through their answers before the dominant student provides all of the work. Likewise, you may need to be vigilant in making sure each student only contributes one piece of information; this way the dominant student doesn't finish the whole problem during their turn. While your group does round robin, I would suggest standing at the board and writing out what each student says so the whole group can follow along and you will not lose your visual learners.

Although the collaborative-learning strategies often provoke a lot of complaints from students, if you establish early on that you will be using the strategies consistently, you will find that the students stop resisting as much. Using the collaborative-learning strategies from the beginning will lead to a much better PLTL experience for you and your students.

"Pity does not get you aid. Admiration at your refusal to give in does."
By Victoria Cooke

So you've had your first few PLTL sessions and your worst fear wasn't realized: they actually talked! Not only that, but they seemed to get along well! I know that I was most scared of constant silence going into PLTL. Once you realize that simply having people talk is no longer an issue, it's time to look at what everyone is saying and try to make sure it is productive and useful.

First, the best way to make sure that the discussion in your PLTL session is beneficial to everyone in the group is to make sure that you are adequately prepared for the problem set and session. The best thing to do is make sure that you understand every aspect of the problem set and that you don't have any questions about any of the problems. The best time to do this is during PAM when you are going over the problems with your fellow PLTL leaders. It can be really tempting to race through the problem sets during PAM because it's Friday afternoon and no one else seems to have any questions or doubts about any of the concepts. However, if you have a question, chances are good that a student in your group or another leader's group, or even another one of the leaders, has the same question, so it will benefit everyone else in PAM.

As you have probably noticed in your sessions already, it can be tempting to allow the students who want to talk the most to take over the discussion. However, it is beneficial to the group as a whole, and especially the quieter students, to ask the quieter students what they think about a problem, or another student's method, or the solution that the group came to. Making sure that everyone gets a chance to participate in the group is one of your main roles as a PLTL leader. Sometimes when you ask a student to participate in a problem that they're not sure of, they may try to convince you to tell them the answer. However, look to the quote from Katniss that titles this paper as advice: if you give in and tell them an answer once, they will be more likely to ask for answers later and less likely to put forth ideas.

Next, I have a warning about snacks. Snacks are one of them best ways to help your students feel comfortable and participate in your PLTL session. However, all snacks are not created equal. Try to avoid bringing in super-sugary snacks (for example, puppy chow) because even college-aged students can have trouble focusing with too much sugar in their bodies.

Finally, there are going to be times when your group gets distracted and starts talking about other things. This can be very distracting, like if it happens in the middle of a small group or pairs problem. In these cases, try to remind them that any benefit that they get out of PLTL comes directly

from the effort that they put into it, so it's in their best interest to try to stay focused on the problem set. However, if the whole group gets distracted after a problem is finished, and it is towards the middle or end of the problem set, I would let them talk and be distracted for a few minutes before bringing their attention back to the problem set. Remember that it is the weekend and two hours is a long time, so a couple minutes of relaxing and distraction can help bring focus your group on the problem set when it is over.

"The dominant student: every PLTL leader's worst nightmare."
By Jessica Erlich

Throughout your PLTL journey, I'm sure you have heard this exaggeration many times from new and past leaders. As a PLTL group settles in, students usually fall into different archetypes, and the "dominant student" category is commonly considered one to look out for. While it is generally true that dominant students should be approached with caution, you should also be mindful of several other kinds of students and how they interact together in session. The nature of these interactions is very much determined by your facilitation style, and so I advise you to seriously consider your group's dynamic early on in the semester.

In your first couple of sessions, you might notice that most students are timid and reluctant to participate. This is typical of a group in its early stages, as students are still warming up to each other and don't want to give off the wrong impression. However, after the first few sessions, your group's dynamic may shift from quiet and nervous to one in which students feel more comfortable to be themselves. In this type of atmosphere, it is inevitable that certain students will emerge as talkative and confident, while others can recede into the background. It is important to balance these various types of students while maintaining a comfortable, open environment. So, what does this actually entail?

When it comes to dominant students, it is important to allow them to express their opinions, but not so much that they discourage other students from participating. Generally, dominant students will be the first ones to speak up in large group discussions, and sometimes, their comments may eliminate all participation from other group members. In small groups, the dominant student may work ahead of their partners and avoid discussing the actual concepts of the problem in depth. Their first priority is usually finishing the problems quickly, which may leave other group members confused and frustrated. For these reasons, it is important to regulate the dominant student in your group, keeping them in check while not discouraging them from participating. A common piece of advice given to new

PLTL leaders is to use Scribe problems to prevent the dominant student from contributing to the group. While this is a good strategy to use once in a while, it will not solve the problem at its root. In the first few sessions, you need to create an atmosphere in which the dominant student will respect and listen to you as a leader; if you allow them to push you around in the first couple of weeks, this behavior will only worsen as the semester wears on. If you set a good groundwork of rules early in the year, you can always remind your dominant student of these rules to keep them in check.

While the dominant student is certainly a threat to your group dynamic, quiet group members are equally as dangerous, and should also be approached with caution. These students will usually be reluctant to contribute to group discussions, and because of this, it is difficult to determine whether they are following along with the material. Sometimes students are quiet because they are confused and frustrated, and sometimes they are quiet because they are more reflective learners, unlike the dominant student. Whatever the case may be, it is important to coax the quiet student into discussions, as this can help to balance out the group dynamic, especially in the presence of a dominant student. In order to do this, direct, probing questions are a good tool; use the student's name when speaking to them, as this will grab their attention and forcibly pull them into the discussion. But be forewarned: the quiet student will not go down without a fight, and will often respond with one word answers or may say "I don't know." But even when the quiet student refuses to participate, do not back down, and eventually, they will begin contributing to the group.

Whatever your group dynamic is, it is essential to get all group members participating without pushing anybody down or leaving anybody behind. PLTL becomes a breeze when your students are comfortable working together and respect one another as peers. Thus, I would make this your first priority when considering your style of facilitation. If you are successful, you will have very few problems with your students!

Training the Tributes
By Vivek Mehta

By this point, you have officially gotten through the awkwardness and nervousness of the first session with your group. However, now comes another important point in the group. It is likely you have been able to identify the obvious characteristics of the students in your group: the infamous “dominant student” and “quiet student”. While these are important students to identify, a leader should remember that there is a large spectrum of student types with different forms of learning. The best thing to do to make your group the most efficient for the semester is to identify the students and their learning styles and cater to them.

The dominant student can be the scariest student to a new leader. But a dominant student can be one of a leader’s best assets when working with the rest of the group. Dominant students can be perfect to get the group going from the start, especially if you have students that are more in the middle of the spectrum and are afraid to talk in the first few sessions. Having the dominant student jump in at the beginning of the discussion can put the rest of the group into the right mindset and help ease the fear that some of the quieter students have about talking in front of the group. However, a dominant student can take over discussion if they are not constrained. The most popular way to deal with a dominant student taking over is to put them as scribe. This can be effective if you emphasize the rule of the scribe not being able to talk. If there disruption is still an issue, don’t be afraid to talk to the student about it directly. It is best not to call them out in front of the group from past experiences because the student can feel hurt and shy away from the discussion of the group.

There are a few ways to try and get the quiet student to come out of the shell and discuss more with the rest of the group. One of the ways of opening up the student is using the problem solving techniques to your advantage. For instance, many quiet students feel more comfortable in large group or scribe since everyone is discussing, diffusing the focus on who is talking. Also, calling another student along with the quiet student to the board tends to work well since then it does not seem like you are picking on them. Round robin is also helpful in that it forces every student to discuss without making it

look like it is focused on the student. The most important thing to keep in mind while working with a quiet student is to make sure it does not look like you are picking on them in front of the group by calling on them a lot. Although you may be just trying to get the student to talk, it can seem to the student and the rest of the group that you are just calling on them since they don't know what they are talking about.

It's important to remember that the previous two examples of students are the extremes on the spectrum. Leaders should be on the lookout in the first few sessions as to how the students in their group prefer to learn. Some students prefer seeing work put on the board, while some like to just discuss with the group. Also, not all students like just seeing lines of equations in front of them, but rather a picture or diagram to explain the tough concepts in Gen Chem. When preparing each week, keep in mind how you should explain the concepts at the beginning of the session's review for each student's way of learning.

The biggest advice I can give for new leaders in terms of sending their group on the best path for the future is don't be afraid of being strict or tough. While you want the group to be social and comfortable with each other, this does not mean the productivity of the group should suffer. Students should be allowed to talk and socialize with each other; in fact it's best if they do as time goes on and students get tired through the semester. However, always emphasize the PLTL philosophy and that they are there to do the problems and learn, especially in the first few sessions. If you emphasize this from the start, the students know when it is time to work and when it is fine to talk about subjects other than chemistry. Remember that the first few sessions is when you set the tone and rules for your group.

You guys have gotten through the hard part of being a new leader, so relax and have some fun. Leaders were chosen not only because of their knowledge of chemistry, but also their ability to facilitate and teach. As time goes on, keep in mind the advice of past leaders and shape it into your own to make the best experience for the group you are leading.

Dominant Student Problems: "Because when he sings…even the birds stop to listen."
By Sarah Swiezy

So it took you, what, about 5 minutes? Okay six? Probably before you had even made it through the first page of the first problem set. You had your students typed: the quiet student, the confident student, the student who took AP physics in high school, the student who should have taken AP physics in high school, the student who works ahead, (add your own descriptor here) student, and the dominant student. You want your sessions to benefit all of your kids, right? But, somehow you leave every weekend feeling like only the dominant student contributed. This student answers all of your questions (usually correctly); he solves the problems quickly and knows exactly how to explain them to the other students; when he starts to talk, everyone listens.

So, how do you get more of your different types of students involved? Enforce the collaborative learning strategies—early…and repeatedly throughout the semester! Your students are going to groan, complain, ask you for the thousandth time why they have to move for pairs, and sometimes blatantly break the rules for all of the strategies, but you must advocate for their continued use so that all of your students remain fully engaged in the problem-solving aspect of every question.

Pairs/Small Group: Especially if you have a dominant student (or two, or three), this is your chance to get the quiet students talking; make your group assignments purposeful (maybe take a minute during PAM to write down the students you want to work together for each problem in the margins of your packet). Try pairing dominant personality types together and shier personality types together to ensure that all students feel comfortable contributing their ideas. Additionally, these questions can serve as a way to refocus the group midway through a mentally-draining problem set—get the students up and moving around by turning small group into an impromptu rock-paper-scissors tournament (best of three, losers in one group, winners in the other), have the students line up from shortest to tallest (pair the two shortest, the next two shortest, etc.); or, use their birthdates, the

number of pets they have, or the color shirt they are wearing to help you decide how to split them up. Tip: to keep these questions from turning into large group, have the groups physically move away from each other to discuss their answers.

Round Robin: This is the most intimidating strategy for your students because the expectation is that each person must contribute something. Make sure that you let your students know that any information is helpful, including guessing how to start the problem, restating the relevant parts of the question, or writing the given information on the board. Play up the contributions of the quiet/shy students to build their confidence, and if you notice that the dominant student likes to finish the whole problem when it's his turn, always start with the person to his right and establish a clockwise rotation (if all goes well the other students will have solved the problem before the dominant student even gets a chance to talk!). Also, to ease your kids' anxiety about round robin, give them a minute to think themselves and process the question before immediately asking for input from the first person. Tip: if you find that getting your kids to take turns talking in a clockwise manner is more difficult than the chemistry itself, try having them pass an object around the circle to keep track of whose turn it is to speak.

Scribe: It can be frustrating when no one *ever* volunteers to be scribe, but you can use this to your advantage. If no one volunteers, assign the dominant student as scribe and make sure to enforce the no-talking, no-autonomous-writing rule; this will help to minimize the dominant student's role in the problem solving and force the rest of the group to participate. (As an aside, you should sometimes assign someone other than the dominant student as scribe—you don't want anyone to feel picked on.) If you notice that some of the students who are not at the board are working ahead in their packets instead of actively participating, have all of the students put their packets in a stack in the center of the table; and, if the scribe problem is really long, choose a different scribe for each part of the question. If scribe problems continue to go poorly for your group, set a good example by making yourself scribe once in a while. Tip: always offer to write down the information in the scribe's packet!

Adapt these strategies to best fit your group, and remember that the more excited you get about using the strategies and the more seriously you take following their rules (especially in the beginning), the more enthusiastically and seriously your students will take them as well!

Putting Out the Fire
By Vidit Talati

So you are a couple weeks into your sessions, you have started to get a general feel for what kind of students you have, and you are starting to feel comfortable in your role as a study group facilitator. Everything seems to be going relatively smooth; there are no major complaints, but then there is that one student who just decides to be the hero of the group. Although you should appreciate his or her participation and eagerness to contribute, you should also begin to realize this student is suppressing the participation of fellow students. However, this is nothing to worry about! This is a classic example of the "Student on Fire," or the dominant student.

As a PLTL Leader, it is your job to understand the personality of your students and shape your sessions in such a way that all the students feel comfortable around each other and you. One of the most effective ways to do this is to be attentive and willing to adapt to how your students feel each week.

If you have introverts, you can try opening up to them and, hopefully, they will reciprocate by talking up in sessions to come. Or, you can pick on them every once in a while to read the question. This way there is no pressure to actually vocalize about chemistry material that they are unsure of, but it still allows them to have a presence in the group. You can also take advantage of the different problem-solving strategies. Scribe and Round Robin are great for these students because it obligates your chemistry peers to have an active, and most importantly, equal say in how to approach a problem.

Then you have the dominant student, as our class likes to call the one "on fire." This student usually has a lot to say, which can detract from a helpful study group because only one person ends up talking. It's actually not too hard to take care of these kids though. You have to remember that they look up to YOU; they will listen respectfully to what you have to say and in which direction you want the discussion to unfold. Just a nice request to your group for students who haven't spoken up yet to do so will usually result in dominant students backing down. Don't be afraid to use the problem-solving strategies as well. Pairs and small groups is an effective way to minimize the academic weight of the "student on fire." For pairs, pair the quietest students together and the most talkative students together. What will ensue is the quiet students being forced to talk in order to break the awkward silence and the talkative students simmering down to avoid clashes of thoughts. Use a similar strategy during small groups too.

Overall, just remember that however you decide to run your sessions, your students respect you. They will listen to you and soak in what you have to say. Let that be the cornerstone to how you advocate for good study habits. This also includes vocalizing your thoughts, questions, concerns, etc. (make sure to hit this point earlier on so the quiet students can feel more comfortable around you). Good luck to everyone and put out the fire!

