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Let My People Go

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Abstract

Motivating students to study and learn chemistry is difficult especially as the semester progresses and more and more abstract concepts are introduced. Peer-Led Workshops have many types of students: some students are independent learners that don't need extra help; many students, however, benefit significantly from closer to one-on-one attention. This latter category of student often has a tendency simply to become overwhelmed without extra assistance and then to give up. Peer-Led Team Learning at UTEP offers strategies to reach those students in need of significant help. One of them is the "Let my People Go" incentive that offers all students in Workshop the opportunity to leave early (e.g. 20 minutes early from the two-hour workshop) if they demonstrate understanding of the concepts for the week. After the independent or successful learners have departed, the peer leader can focus on and personally assist the "Lost Sheep": those students in greater need of the one-on-one problem-solving attention.

Introduction

The University of Texas at El Paso adopted Peer-Led Team Learning (PLTL) (Gosser and Roth, 1998; Gosser et al, 2001) in first semester general chemistry (Becvar, 2012) in fall 2000 by means of a National Science Foundation Model Institutions of Excellence grant (Flores, 2006) as the funding source for paying the Workshop leaders. Within a few years this PLTL program evolved into a more 'Free-Style' (Hernandez, 2006; Johnson, et al, 2008) format (see articles in these Proceedings) which has given the leaders some freedom to experiment within the larger framework of educating the students in course. This 'Free-Style' format allows individual peer leaders the opportunity to exercise their own creativity for motivating students (Dickson, et al, 2006; Ramirez, et al, 2010) as well as to develop and adapt new strategies for learning (Azam, et al, 2006; Alarcón, et al, 2006; Noveron, et al, 2006; Roacho and Becvar, 2008) while they enhance their leadership skills. The roles of leader, facilitator, and peer to the students in Workshop bring a great sense of responsibility and develop an unconventional (for undergraduate students) professional growth within the peer leader (Mendez, et al, 2008). Workshop represents an important initial step in the preparation for every peer leader's professional life (Loya et al, 2008).

It is no surprise that the peer leaders use this opportunity to motivate students most in need of this influence. Leaders show students that they can be successful if they apply themselves. With proper attention, students can become more confident in their learning abilities. Free-Style PLTL allows the peer leader to take advantage of the different styles of learning and learners (Felder and Silverman, 1988). Often, however, the impact of low scores on examinations over the initial material

combined with introduction of additional abstract concepts during the course overwhelms some students into despair. Peer-Led Workshops have many types of students. Some students are independent learners who don't need extra help. Many students think learning chemistry is just like learning in any other course where memorization leads to success; then they are caught in the two-fold trap of poor performance so far and new complicated material on top of that. This latter category of student often has a tendency simply to become overwhelmed without extra assistance and then to give up. Under these circumstances, motivating students to renew efforts to study and to learn chemistry is difficult. Peer-Led Team Learning can offer strategies to reach those students most in need of significant help. One such strategy is the "Let my People Go" incentive that offers all students in Workshop the opportunity to leave early (e.g. 20 minutes early from the two-hour workshop) if they demonstrate understanding of the concepts for the week. After the successful learners have departed, the peerleader can focus on and personally assist the "Lost Sheep": those students in greater need of problem-solving attention and practice. These students often benefit significantly from one-on-one attention over a period of time.

Guiding principle: "If you can't explain it to me, you don't understand it."

After being involved in a number of workshop sessions early in the semester, a peer leader often is able to distinguish students who seem to grasp concepts faster than others. Sometimes those 'more able' can become disruptive, but sometimes those same disruptive ones later can be convinced to become assistants (Kim and Becvar, 2006). The small size of Workshop allows the peer leader to judge who needs less help and who needs more. One guiding principle to distinguish who needs additional help is "If you can't explain it to me, you don't understand it." Independent learners who demonstrate understanding are allowed to depart a few minutes early, leaving those students needing focused attention to receive more concentrated help from their leader in the last minutes of workshop.

Even with homework, the 'threat' of the quiz, and other chiding, many students arrive in Workshop having little understanding of the meaning of the words being used to describe the chemistry behind the problems at hand. Extra time spent one-on-one probing by questioning and engaging the individual student in answering simple questions can convey this 'meaning'. The student can then see and use abstract words in the context to help them find a solution. The peer leader can feel more confident that a student has grasped a concept when the students can explain to the peer leader how they are able to derive a solution and the reasoning behind their strategy. A student's expression or reaction when a concept has become lucid is a particular sign of a student's sense of accomplishment. When the students are able to respond, "Oh I see..." or "That's what that meant..." and are able to complete the assignment knowing what they did, the student is on the path to success. The guiding principle mentioned above describes an important idea in education. The 'Let My People Go' strategy can give the 'lost sheep' a sense of accomplishment and success. All students are expected to show understanding on the concepts of the course, but often a range of ability to grasp the essentials is apparent. Assessing a student on understanding of chemical principles, that is, the reasoning and logic behind the concepts, allows every student to develop competency as a learner and to experience a sense of achievement: an important step in confidence building.

Who stays, who goes: "How to decide...?"

It is important that each student is verbally assessed during Workshop, especially towards the end of each session, otherwise the peer leader may wrongly conclude that a student has fully grasped a concept. The peer leader should make time for each student in the workshop by constantly moving around the classroom, interacting with all students, and probing understanding. Each student must explain out loud what he/she has done to arrive at an answer including the key intermediate steps. It is important that the student not only follows a pattern to solve a problem based on a given example, but to understand why the certain steps are being used and where numerical values come from. Students should also be able to make connections between the current topic and past concepts.

Here is an example from Thermochemistry: calculate the enthalpy change, ΔH° for a reaction using the Direct Method. Here is the reaction:



Students calculating the enthalpy change of the reaction must understand, among other consequences, that water formed in *gas form* from the elements of which it is composed, has an enthalpy of formation of -241.8 kJ/mol. They must understand that conducting this reaction means release of heat (exothermicity) because of water formation; further, that production of nine moles of water releases nine times as much heat as one mole, etc. With a few probing questions it is possible to determine if the students understand the use of Hess' Law to subtract the enthalpies of formation of reactants from the enthalpies of formation of products and to explain that the enthalpy of formation of oxygen is zero because molecular oxygen is the stable form of the element.

Compound	H _f (kJ/mol-K)
B ₅ H ₉ (g)	73.2
B ₂ O ₃ (g)	-1272.77
O ₂ (g)	0
H ₂ O(g)	-241.82

Table 1 below gives a plan for the timing of portions of a generic Workshop.

Table 1. The Generic Plan for Timing Within a Workshop

The Ideal Plan = Motivation			
15 minutes	35 minutes	40 minutes	≤ 20 minutes
Quizzes: Assessing for previous concepts and new concepts, allowing the student and peer leader to know what the students understand.	Students are presented with chemistry related ideas, theories, and equations that can guide them as they approach a chemistry problem covering new content.	During the lab section of workshop, students are exposed to "live" chemistry where they are able to visualize, explore, and make real world connections to chemistry concepts.	The more efficiently the student works and is able to explain what he/she has done to arrive at an answer, the earlier the student can leave.

Results and Discussion

A total of 17 students from three workshop sections responded to a survey (having signed an Institutional Review Board Consent form) addressing the issue of being released early from Workshop. They were asked if they strongly agreed, agreed, disagreed, strongly disagreed or neither agreed nor disagreed. Figures 1 and 2 present the results.

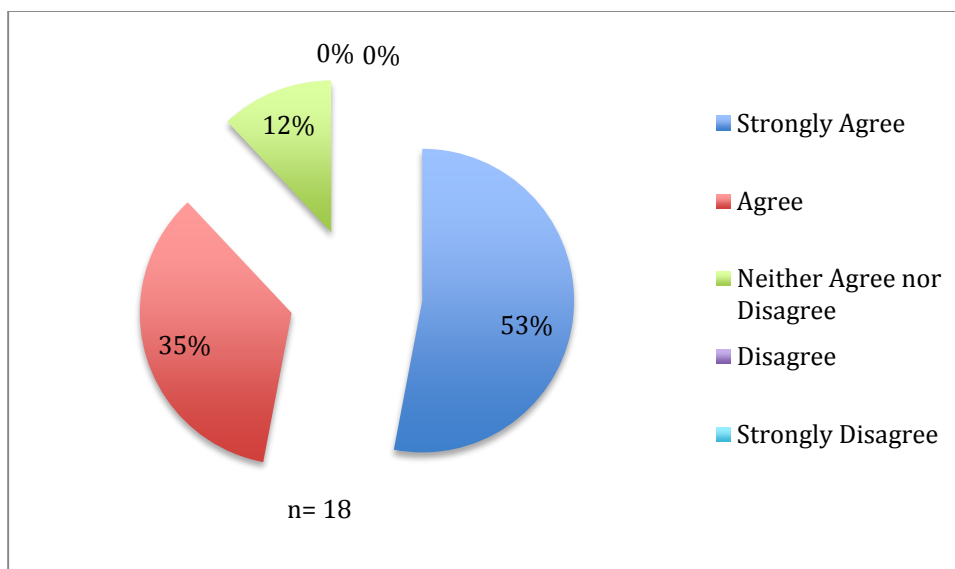


Figure 1. I appreciate being let out earlier from workshop when I demonstrated competency on the subject practiced during class.

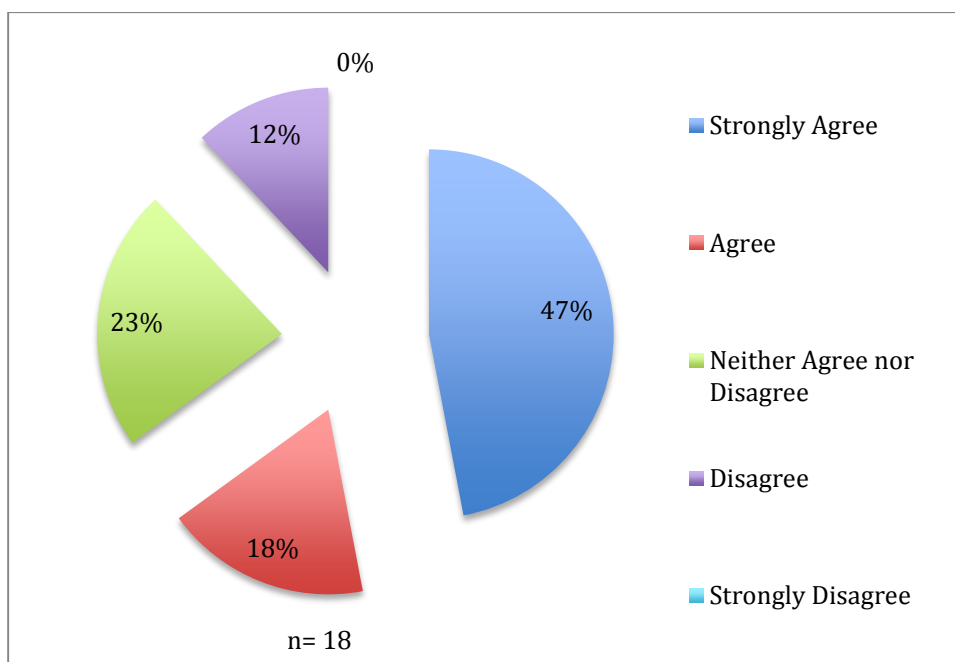


Figure 2. I found that the opportunity to be released earlier from workshop motivated me to understand general Chemistry concepts.

Almost 90% of the students (Figure 1) appreciated this approach as shown by agreeing or strongly agreeing with the statement: “I appreciate being let out earlier from workshop when I demonstrated competency on the subject practiced during class.” Almost two-thirds of the students

(Figure 2) found the idea of the possible early release from workshop motivated them to better understand general chemistry concepts.

The same 17 students were asked the following open response question.

"How did being released from workshop when you demonstrated competency on the subject practiced during class benefit you or make you feel?" Here are some of the responses:

"Motivated me to walk into class already knowing my material, so I would understand class discussions allowing me to be released."

"Made me feel like it was to my advantage to utilize the time during workshop efficiently to complete assignments."

"It is a reward for your effort."

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