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1. Enable your speakers and mic
2. The top bar icons should be green.
3. Run the audio setup wizard (use "Meeting" menu on top left).
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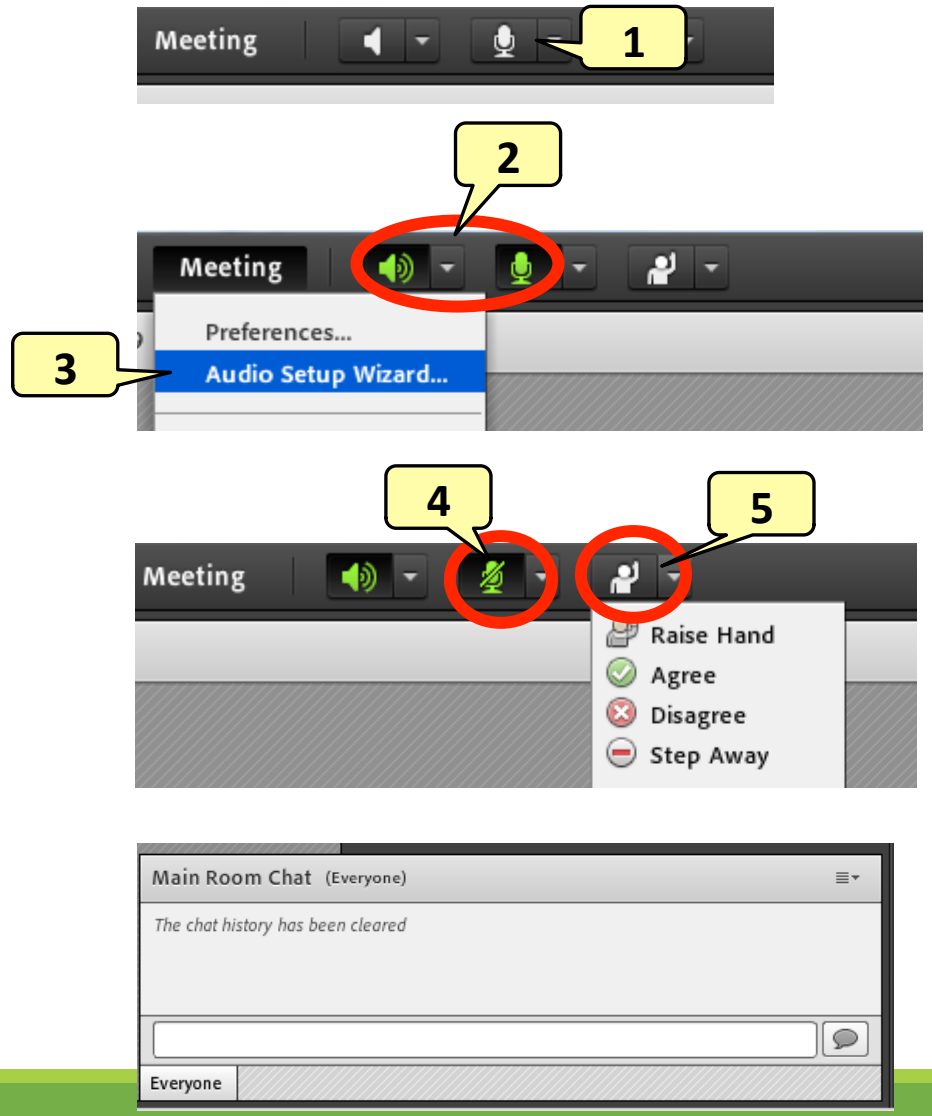

Start Recording

Faculty Virtual Community of Practice
Mechanical Engineering

Session 7: Teams and starting out next semester

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Agenda

Welcome, survey results and learning objectives (5 mins)

Presentation - learning groups (15 mins)

Group Breakouts – work through assignment (15 mins)

Report out (15 mins)

Presentations on plans for next semester (20 mins + 15 mins discussion)

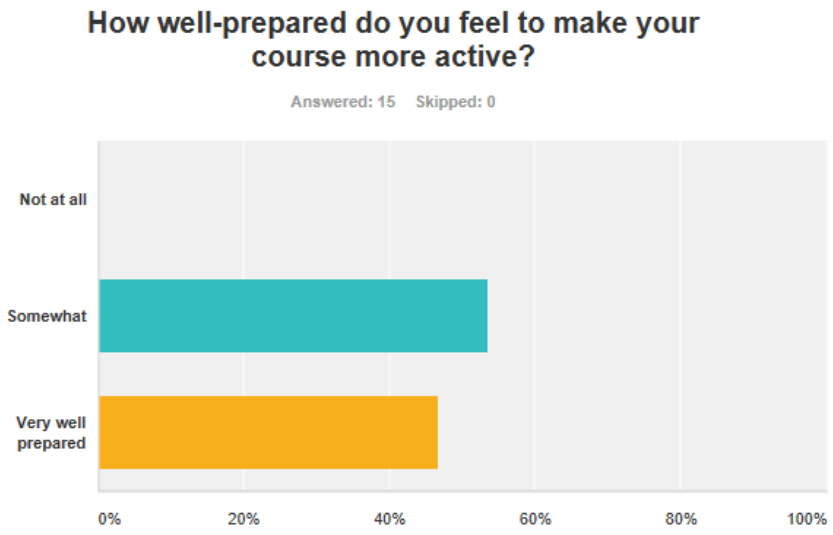
- Diana Bairaktarova - Dynamics
- Mark Bedillion – Dynamic Systems
- Estelle Eke - Dynamics
- Nancy Moore and Dede Nelson – Thermo I
- Ruth Ochia – Statics and Strength of Materials

Preparation for next time (2 min)

Survey results

Thanks for your participation in the survey. Some ideas for change coming out of results:

- Have each group present 1 or 2 ideas in depth rather than a complete summary of their discussion.
- Inclusion of material on more best practices
- A folder for organizing resources and other literature



Session 7: Learning Objectives

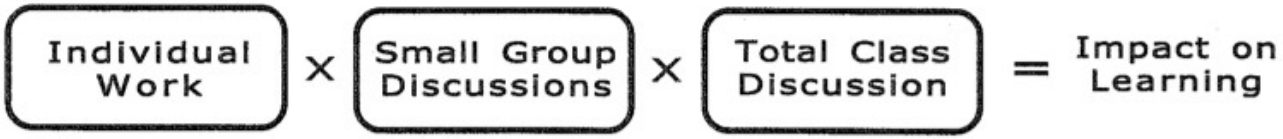
Develop an understanding of methods for the effective use of learning groups in the classroom.

Learn about plans for some of our members for next spring's courses.

Effective usage of learning groups

Three fundamental principles for creating conditions for motivating students to prepare for and engage in give-and-take discussions:

1. *Promoting individual and group accountability*
2. *Using assignments that link and mutually reinforce individual work, group work and total class discussions*
3. *Adopting practices that stimulate give-and-take interaction within and between groups*



("Three keys to using learning groups effectively," L.K. Michaelson, *Teaching and Learning News*, Vol 12, 2003)

#1: Promoting ongoing accountability

Mechanisms for promoting *individual* accountability:

1. *Individual assignments before group discussions (students turn in written work summaries at the start of class).*
2. *Using procedures/assignments that cause members to express their point of view during discussion.*
3. *Include peer evaluation in grading.*

Mechanisms for promoting *group* accountability:

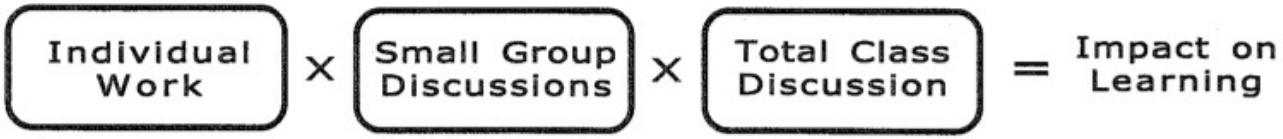
1. *Groups are required to produce a tangible result.*
2. *Group output should enable both quality assessment and inter-group comparisons.*

("Three keys to using learning groups effectively," L.K. Michaelson, *Teaching and Learning News*, Vol 12, 2003)

#2: Using linked and mutually reinforcing assignments

Assignments in the first two stages have a powerful effect on the learning that occurs in the third stage (the 3 "S's"):

1. Same problem*: individuals/groups should work on the same problem*
2. Specific choice*: individuals/groups should be required to use course concepts to make a specific choice as their outcome*
3. Simultaneously report*: groups should report their choices simultaneously*



("Three keys to using learning groups effectively," L.K. Michaelson, *Teaching and Learning News*, Vol 12, 2003)

#3: Practices to stimulate idea exchange

1. Using assignments that require group interaction: *avoid oversimplified assignments (no sharing of ideas) and avoid lengthy assignments (efforts too compartmentalized).*
2. Removing barriers to participation: *assigning roles within group recorder, group reporter, devil's advocate*.
3. In-class group work: *allowing for group work to be done during the class period (outside of class, members will meet only long enough to divide up the work, and the work will be done by individuals).*
4. Creating diverse groups: *creation of diverse groups requires,*
   - *identifying dimensions that make a difference in student performances in a specific course (study major, previous course work, relevant work experience)*
   - *sorting students into groups according to member assets and liabilities*

("Three keys to using learning groups effectively," L.K. Michaelson, *Teaching and Learning News*, Vol 12, 2003)

Best practices for using learning groups effectively

- Use tasks that are appropriate for groups: *brainstorming, making a specific choice, forming strategies, debating an issue. Detailed problem solving is NOT appropriate.*
- Align activities with learning goals: *clearly identify learning goals and then choose activity that will result in the achievement of this learning goal.*
- Phrase assignments to promote higher-order cognitive skills: *best questions are open-ended, possibly controversial, and having no single answer.*
- Successful group activities have a highly structured task: *provide specific instructions on the task, the expected product of their work, and the method of reporting out. ALWAYS set a time limit for the task.*

("Guidelines for using groups effectively," C. Hershock and S. Milkova, *http://www.crlt.umich.edu/gsis/p4_1_5*)

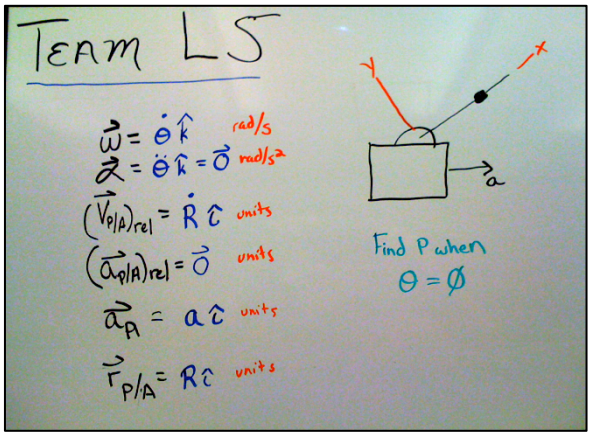
Best practices for using learning groups effectively (cont)

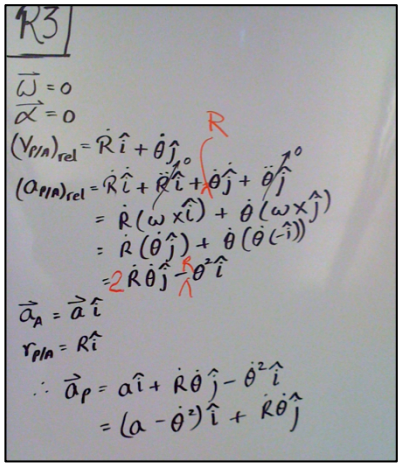
- Promote group cohesiveness: *choose tasks that promote positive interdependence of group members.*
- Have students do individual work before entering their group: *require each member to work independently first so that all has something to contribute. Activity can be done prior to class.*
- Ensure both individual and group accountability
- Select a debriefing mechanism that promotes high-energy class discussions and reflections: *keep groups' output for class discussion simple and focused on essential data.*
- Effective group activities are interesting and relevant: *create a problem that is engaging, complex, realistic, relevant and built on prior knowledge.*

("Guidelines for using groups effectively," C. Hershock and S. Milkova, *http://www.crlt.umich.edu/gsis/p4_1_5*)

Example: Flipped classroom for Dynamics

1. Students view short 8-10 minute lecture-type video online before attending lecture.
2. At start of lecture, students take short quiz covering material in pre-lecture video to insure that the video has been watched.
3. Instructor works examples and/or leads class discussion for the day.
4. Class works in learning groups made up of 3-4 students in answering a set of conceptually-oriented questions. Teams report out on "huddle boards" (portable white boards with markers, results recorded with your cell phone camera).





Example: Flipped classroom for Dynamics (cont)

Blocks A and B (having masses of m and $2m$, respectively) are connected by a lightweight, rigid rod. In System 1, a force F acts to the left on block A. In System 2, the same force acts to the left on block B. Let F_1 and F_2 represent the magnitude of the load carried by the rod in Systems 1 and 2, respectively. Circle the answer below that most accurately represents the magnitudes of F_1 and F_2:

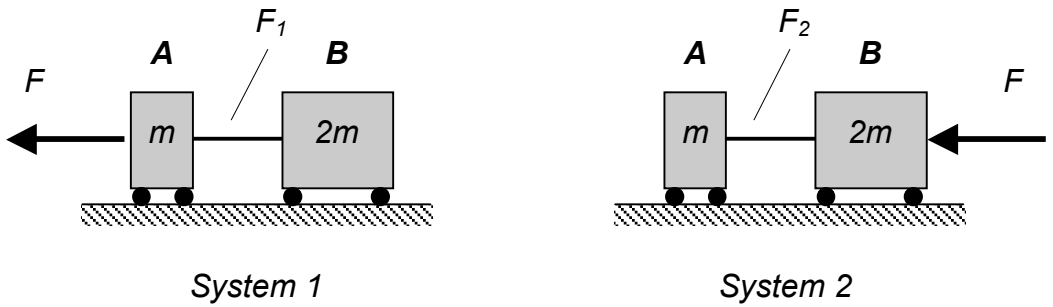
a) $F_1 > F_2$

b) $F_1 = F_2$

c) $F_1 < F_2$

d) More information is needed to answer this question

Provide a justification for your answer.



Example: Flipped classroom for Dynamics (cont)

Particle P travels in a vertical plane within a smooth, circular slot, where the radius of the slot is $r = 05$ m. At the position shown below, the speed of P is known to be $v = 3$ m/s. For this position:

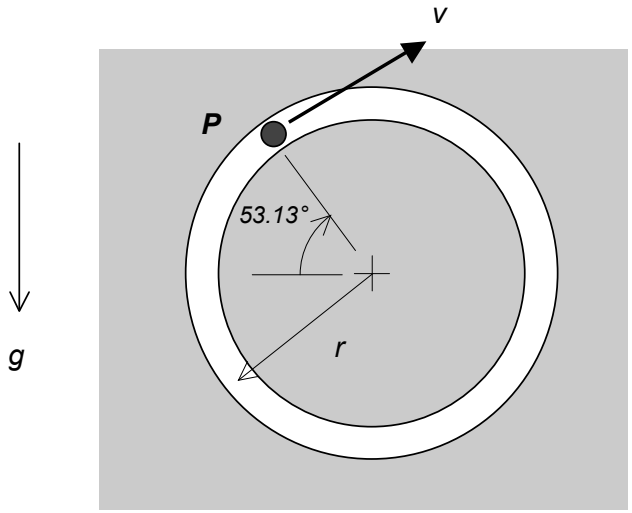
a) P is in contact with the outer surface of the slot.

b) P is in contact with the inner surface of the slot.

c) P is in contact with neither surface of the slot.

d) More information is needed to answer this question

Provide a justification for your answer.



Example: Flipped classroom for Dynamics (cont)

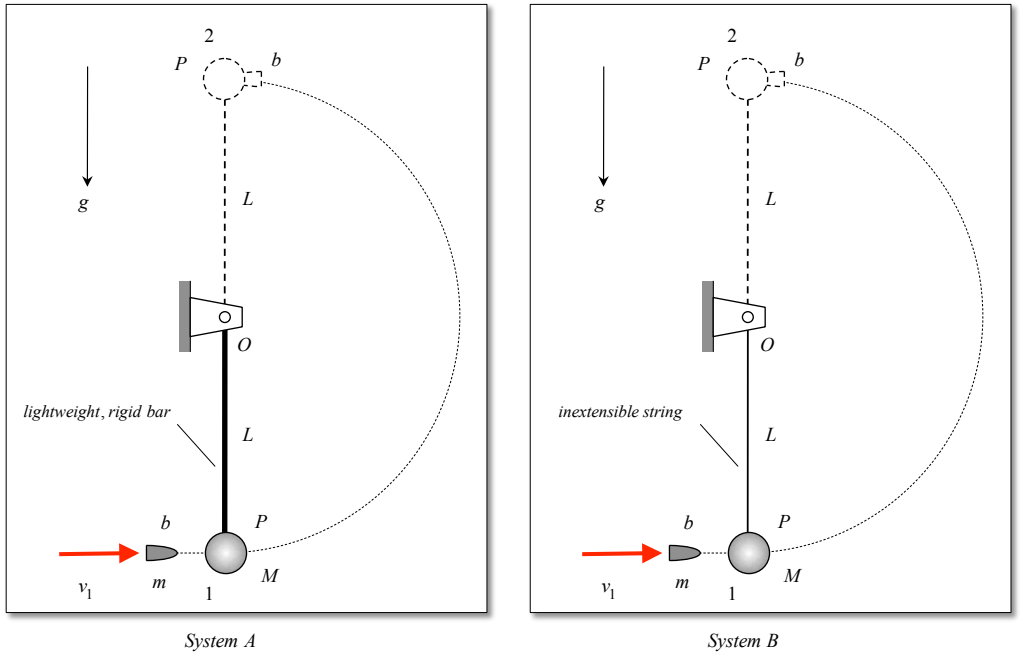
In System A shown below left, particle P connected to a pin joint at O with a lightweight, rigid bar of length L. Bullet b impacts the stationary particle P with a speed of v_1, and after impact the bullet sticks to P. System B is identical to System A except the rigid bar is replaced by an inextensible string of length L. Let $(v_{1,min})_A$ represent the minimum value of v_1 that is required for particle P in System A to reach position 2, a position where P is at a distance of L immediately above O. Let $(v_{1,min})_B$ represent the minimum value of v_1 that is required for P in System B to reach position 2. Circle the response below that most accurately describes the relative magnitudes of $(v_{1,min})_A$ and $(v_{1,min})_B$:

a) $(v_{1,min})_A > (v_{1,min})_B$

b) $(v_{1,min})_A = (v_{1,min})_B$

c) $(v_{1,min})_A < (v_{1,min})_B$

Justify your response with equations and/or words.



Example: Think-Pair-Share

Students think of answers individually, then form pairs to produce joint answers, and then share answers with the class.

Pose the problem and have students work on it individually for a short time; then have them form pairs and reconcile and improve their solutions; and finally call on several individuals or pairs to share their responses.

Group Activity: Breakout Session

In this breakout session, each breakout group is asked to come up with the details of several THINK-PAIR-SHARE activities that can be incorporated into your courses in the spring semester.

Time: 15 minutes
Assigned scribe and reporter

Report out: Plans for next semester

Diana Bairaktarova - Dynamics
Mark Bedillion – Dynamic Systems
Estelle Eke - Dynamics
Nancy Moore and Dede Nelson – Thermo I
Ruth Ochia – Statics and Strength of Materials

Diana Bairaktarova - Dynamics

Challenge: I will be teaching the course for a first time and I am sure until I figure out best practices it will be error and trail through the semester. I don't want, however this to effect the learning experience of my students.

Solution: A comprehensive schedule, planned learning activities, and assessments before the semester starts will help me be adequately prepared. I plan to use project and problem based approach, working in small groups in class, and utilizing online modules with provided feedback. In addition, learning all students' names, what their learning styles are, and being available to help will hopefully help me encourage students to stay motivated through the semester.

Plan:

- Learning style survey prior to class
- Dynamics concept inventory (before and after the semester)
- Assign online homework with immediate feedback
- Students writing concept and open ended problems as a group
- Solving problem in class and letting students grade it
- One minute paper at the end of each class
- Have students work examples in small groups and get a group grade
- Using every day examples to explain concepts
- Let students create their own every day examples
- Small group project

Mark Bedillion – Dynamic Systems

Class – Introduction to Dynamic Systems

Issue and Proposed Solution – This class is quite abstract, and we do not have a laboratory component to the class. I have developed virtual laboratories (in Simulink) with a student this semester that will be implemented next semester to address this. The laboratories feature virtual reality models of some of the laboratory hardware we use in our senior elective control systems course. In addition to incorporating these labs, I will be implementing active learning strategies from the VCP.

Plan of Action

- Assign the virtual laboratories as mini-projects throughout the class, allowing the students to work on the projects in small groups.
- Use socrative.com to administer short in-class interactive quizzes to quickly assess student learning. I will plan on giving one short quiz in the middle of every class session at a minimum.
- Use the control systems concept inventory as a post-test. Unfortunately I do not have any control data for this test.
- Have students work some examples in small groups to break up the class.

Estelle Eke - Dynamics

Course changes:

- Ways to motivate students to do homework
  - Extra credit for some items
- Student Self Assessment
  - Administer self-assessment Quiz in week 1
- Rubric
  - Monitor Class Participation via clickers

Assessment:

Rubrics

- Class Participation
- Availability before major tests

Nancy Moore and Dede Nelson – Thermo I

Changes for the Spring in Thermodynamics I

1. In-class groups

   This semester I have required students to work in groups on class problems. I created the groups and rearranged them three times during the semester. Some groups functioned very well but others were hindered by absent or unprepared group members.

   In the spring, I plan to again create groups but I'll also have each student fill out a Teamwork Rubric for each group member, the results of which will count towards each student's grade. The rubric will allow for satisfactory or unsatisfactory grades to be given for attendance, preparedness, contribution, respect, etc. In addition, one group member each week will be assigned as the leader of the group. The leader will be responsible for keeping the group on task and asking questions or explaining solutions for the group during the class.

2. Class objectives

   Present objectives at the beginning of the week so students will know the purpose of their work and will be able to self-assess what they've learned.

3. Exam wrappers

   Have students complete a self-assessment survey after each test to determine how the students prepared for the test, what problems they struggled with, what grade they predict, etc.

4. Emphasize more real-world examples.

5. Use thermodynamics concept inventory at the mid-point and end of semester to determine students' improvement.

6. Add more feedback to online quizzes and use quiz results to determine topics that need to be discussed again.

Ruth Ochia – Statics and Strength of Materials

1. Include a concept inventory at the start and end of course to see how students have understood the material
2. **Focus practices and assessments on stated course goals in syllabus**
    a. To accomplish this goal, I would
        i. Review my stated course goals
        ii. Make sure I have "active" descriptors for what I expect students to know by the end of the course
        iii. Assign the Bloom's Taxonomy levels to each goal to see if I have included higher levels in my course goals
        iv. Make homework/classwork assignments reflect each goal
            1. Have direct instruction reflect each goal
            2. State which goal(s) is(are) being learned in that class at the start and end of class
        v. Include "minute papers" to get student feedback on what topics need to revisited
        vi. Include "concept questions" during class to see if students are really understanding the concept
            1. I can give out letters so that they can answer the multiple choice problems
            2. First they would answer individually
            3. Then they would work with others and answer question again
3. Include more group problem solving sessions
    a. Perhaps have some group quizzes
    b. Have more student lead problem solving
4. Include more open-ended problems, which would ask students to consider "best" options based on selected constraints
    a. These would be added throughout the semester
    b. Based on fundamentals practiced during the semester
5. Include on-line homework assignments so that students would get immediate feedback on how well they are doing
    a. Reduces grading for me
    b. The problems would be different from what is in the book (at least the numbers) so that just giving the "correct answer" would be discouraged

Assignment for Next Week

TOPIC: More on learning groups and student-centered instruction

1. Read the following:
   "Navigating the bumpy road to student-centered instruction", R.M. Felder and R. Brent, *http://www.ncsu.edu/felder-public/Papers/Resist.html*

2. Activities:
   - If you have not yet submitted a preliminary draft for next semester's course, do the following: i) prepare an outline of how your course will change in the coming spring term, ii) choose one aspect of this change, and iii) in one or two paragraphs, flesh out the details on how you plan to bring about this change. Be prepared to present and discuss at next week's FVCP.
   - Choose a particular concept from the course that you will be teaching in the spring. For this concept, answer the following questions: What do you want the students to learn? What is a TEAM activity that can be used to help them learn the concept? What are the unique aspects of your course that affects this activity (large class size, fixed desks making group activities difficult, etc.)? Create two conceptually-oriented questions for team activities related to this concept. Consider the learning objectives for your course in creating this questions.

3. Post your activities to the Mechanical VCP Folder by 5:00 PM Sunday Dec. 15th