AC 2010-1211: LEADERSHIP 107: STUDENT CENTEREDNESS – A BALANCE

Jerry Samples, University of Pittsburgh, Johnstown
DR. JERRY SAMPLES holds a BS Ch.E. from Clarkson College, MS and Ph.D. in ME from Oklahoma State University. Dr. Samples served at the United States Military Academy twelve years before assuming the position of Director of the Engineering Technology Division at the University of Pittsburgh at Johnstown in 1996. After a five year period as the Vice President for Academic and Student Affairs he returned to the Engineering Technology Division. He is a Fellow of the International Society for Teaching and Learning receiving that honor in 2007. In 2008, he received the American Society for Engineering Education National Outstanding Teaching Award.

Leadership 107: Student Centeredness – A Balance

Abstract

In today's academic world there are several terms that indicate a new direction in faculty-student relations – one such term is student-centeredness. This term and its implications are part of the paradigm shift from teacher-centered to student-centered in current learning models. Basically, teaching is not about the faculty member and it is not totally about the student: rather, it is about a level of balance that needs to be maintained to promote student learning. Classes, office hours, and research need to be balanced to foster student growth while allowing faculty time to get their work accomplished. Thus, there are elements of time management, self-discipline and organization that assist in striking the balance required to make student-centeredness work.

This paper will discuss the balance of professional needs with student needs and wants. It will make suggestions for establishing a student-centered class in the most time constrained time – the tenure years.

Introduction

The term student-centered is the opposite of teacher-centered: the standard lecture format that teachers often use in teaching engineering and science courses. Student-centered approaches include various levels of interactive and active learning wherein students are asked to assume more responsibility for their learning. Techniques for student-centered learning include: interactive, collaborative/cooperative, active, problem/inquiry based, and team learning. Each of these take into account the need to provide the "customer" with learning environments that have proven results: i.e., better learning that manifests itself in improved retention. However, there are mixed reviews from faculty and students on the effectiveness of these techniques in improving learning. Faculty experience in the classroom may not include any of these techniques and students expect to be taught rather than to work to learn. Felder[1] comments on the use of collaborative learning that:

> Obstacles to the widespread implementation of cooperative learning at the college level are not insignificant, however. The approach requires faculty members to move away from the safe, teacher-centered methods that keep them in full control of their classes to methods that deliberately turn some control over to students. They have to deal with the fact that while they are learning to implement CL they will make mistakes and may for a time be less effective than they were using the old methods. They may also have to confront and overcome substantial student opposition and resistance, which can be a most unpleasant experience, especially for teachers who are good lecturers and may have been popular with students for many years.

While experienced teachers have little to lose in implementing student-centered classroom techniques, new faculty members must take care in providing instruction via a method that students consider an "unpleasant experience." Experienced faculty will survive a few terms with potentially lower course evaluations – new faculty may not have that luxury. The fact that

students may be less than accepting of some student-centered techniques raises the question of how to incorporate these techniques to maximize learning while "protecting" new faculty from the potential pitfalls associated with the techniques.

Balance

Balance focuses on the entire student/faculty interface: classes, office hours, and faculty needs during the tenure years – especially scholarship. Samples[2] addressed research and scholarship at length and adds comments related to teaching. He states that for a 3 hour course, the minimum number of hours dedicated to class is 9 hours per week. Wankat [3] states that: "The lecture method is most commonly used since it is widely believed to be the most efficient use of the professor's time." But, at the same time he adds that: "Most new faculty members drastically overprepare and spend much more time than we have suggested here (Boice, 1991)." This reference is in line with the times presented by Samples. Thus, time is one of the major considerations when developing the balance necessary to teach while including some degree of student-centeredness.

From the student's viewpoint, obtaining a letter grade is one of the important measures of learning. As mentioned by Felder, most students are comfortable in the lecture situation and even resist new forms of teaching. In recent years, some students do come from more progressive high schools and have experienced some advanced teaching techniques: however, the author has recently experienced reluctance by students when more active classroom techniques are used. For some reason students want to be taught only what is needed for those grades. However, more mature students understand that learning is far more important than a grade and to these students; learning and high grades often go hand-in-hand. Beichner et al.[4] state that; "Although students taking these courses [lecture] often do reasonably well on traditional exams, research-based conceptual testing indicate a shallowness in their understanding." Lowman[5] and McKeachie[6] support the notion that moving away from the common lecture results in better student learning since the students are actively involved in the process. Thus, it is important to take students to places where they are less comfortable to expand their experience and prepare them for the world they will enter upon graduation. Felder emphasizes that some students dislike lectures while others truly dislike any form of active/collaborative/team learning experiences. What is necessary is an optimization of the learning experience that balances the needs of students and faculty alike.

New faculty members entering the classroom for the first time have several daunting tasks including: teaching, research, service, and grantsmanship. The need for self-discipline and time management was clearly established by Samples but the execution of the plan that results in a balance is always in question since it varies from person to person. Some faculty members come to the classroom with a charge to be a great teacher and are challenged to use many of the student-centered techniques described in the literature. It may be expected that they are immediately successful in implementing paradigm shifts within colleges and schools that take teaching from lecture to fully integrated collaborative or problem based learning environments. What they find is exactly what Wankat indicated – that they spend a great amount of time getting ready for classes to the detriment of everything else. And, as Felder states, they find that their

efforts are not appreciated by their students. The questions are: Where should they start? and How do they control the time they spend preparing?

Getting Started

As a new professor it is suggested that the most efficient method be used for the first year of teaching: the lecture. There are two reasons that this is suggested: efficiency and learning. Ask any professor when they really knew the material they present and most will say that they really did not "know" the material until they had taught it. The first time through a course will provide time to decide on the content, development of a workable syllabus, and learn the material in great detail. There is no more important key to teaching than to know the material in great depth. Of course, this violates the thesis of this paper – that of student-centeredness. The rejoinder is that the best collaborative teachers are often great teachers experimenting in the new paradigms – learn the material so that success is easier to obtain.

Once the decision is made to move into one of the more student-centered teaching modes it is important to remember the warning provided by Felder that there may be a lot of resistance to the method being pursued. This leads to the first observation when establishing a student-centered course; make the transition slowly by integrating student-centered activities in a few class sessions to emphasize difficult learning objectives or to emphasize an important premise. Thus, as new elements are added it will be necessary to decide on the method to be used. For collaborative learning Fleder[1] states: "In-class exercises, which may take anywhere from 30 seconds to an entire class period, may involve answering or generating questions, explaining observations, working through derivations, solving problems, summarizing lecture material, trouble-shooting, and brainstorming." It is important to note that it is not mandatory to make every minute collaborative; interspersion of collaborative activities will satisfy the students' needs, assist in driving home important points and keep the students attentive. It should also be realized that all active learning activities require preparation time, so select wisely.

Martinazzi[7-8] introduced two effective methods for including collaborative elements into his classes. The "partnering" technique required that students teach designated material to their classmates. When tests were given, partners shared in the collective success or failure of the teaching – learning model. Thus, effective "student" teachers provided a lot to their classmates while less effective "student" teachers may have been a liability. To this end, it was found that the learners were exceptional students since the shared grades affected their classmates. Martinazzi[7] presented four findings:

1. Students believe when one succeeds, all succeed.
2. Face to face interaction supports student's efforts and motivates them to learn.
3. When individual (team) responsibility and accountability are stressed, it (learning) is taken seriously by the students.
4. Working together requires developing social skills such as leading, teaching, reaching consensus, resolving conflict and communicating.

The students in this project initially had reservations but after agreeing to participate they found that teaching was an important way to learn. For the faculty involved, there were risks

associated with "giving up" the podium but there were also rewards in the form of better class relations and improved learning. There were two concerns associated with this experiment: the time invested in setting up the partnered groups and evaluating their teaching and learning, and the content not covered that was usually completed. For new faculty members both of these concerns need to be monitored carefully. Partnering can be limited to one time per term and is best used in smaller classes of 30 or less.

Martinazzi[8] also introduced the concept of THINK – Turning Hunches Into New Knowledge. In this case, students receive short standard lectures and are then required to solve short problems based on the lecture. Some material is withheld so that students must use their intuition to develop solutions. Martinazzi states that: "During this interactive and contemplative time students make a significant intellectual and emotional investment in obtaining solutions." He goes on to say that the students overwhelmingly voted to try this method. Realizing that there may be material left uncovered, the class was given study assignments to complete that material also with a self-reported compliance in the range of 60%. The beauty of the THINK concept is that it can be applied to short problems, or even the 30 second situations mentioned by Felder.

It is obvious from the examples selected that diving in and changing an entire course such that every class is collaborative or problem based is not suggested. Having taught an entire course that was collaborative the effort required to make it work was excessive and not conducive to the tenure years. The truth about using alternative teaching methods when teaching students with differing needs (learning styles) is that you cannot please everyone. In a recent article[9] about kinesthetic learning it was found that both verbal and kinesthetic learners did well in that environment even when out of their preferred learning mode. However, when the same groups were exposed to verbal learning – the lecture – both did poorly even when in their preferred mode.

Suggestions

Based on the information above, the following suggestions and discussion are provided concerning balance and student-centeredness.

    1. As a new faculty member it is important to realize how success is measured and to establish goals accordingly. This is the first indicator in the balance that is being sought. If teaching is the emphasis then it is obvious that excellent teaching is essential. There will be a need for some scholarship at any reputable college/university, but the amount may be tempered by the teaching load. There may be an emphasis on student research – more on that later. If research is preeminent, then the emphasis will move from teaching to research and the student research will move from undergraduate to graduate. There will also be grants and other funding that needs to be procured resulting in a reduced focus on teaching. Be careful though, even the most prestigious research universities will use substandard teaching as a means of eliminating good but not excellent researchers. Attempting to add new, exciting and untried teaching methods could lead to classroom disasters while taking a lot of time to plan. Thus, it is important to understand the emphasis on teaching, research and service so that these are balanced even before thinking about student-centered versus teacher-centered teaching.

2. Teach the best you can and do it as efficiently as possible, but know the material well. This advice comes after years of mentoring new faculty and conducting teaching workshops around the world. Teaching is like entertaining except that the show is not for the pleasure of the participants: rather, it is meant to inspire their learning. The word show is included on purpose because that is what we do. We rehearse our lines, seek audience participation and expect applause in the form of good teaching ratings. Rehearsals are necessary in the form of preparing notes and developing a technique that supports the needs of the students and yourself: student-centered versus teacher-centered. Being efficient comes from presenting clearly with a focus on the old tradition of giving lesson objectives, achieving them and then telling the students that the objectives have been met. Teaching well often removes confusion and frees up time that may be spent after class or during office hours trying to teach the material again because it was poorly presented or poorly understood. Efficiency provides more time for other activities like preparing for your heavy teaching load or performing research activities that are a must for tenure. It also allows for student-centered activities such as in class problem solving, group discussions and even student presentations. If time has been well planned then these activities can be inserted to get students involved. BUT, none of this works if mistakes are made during class. It is absolutely essential to be the subject matter expert to avoid embarrassing and noticeable mistakes. It only takes a few mistakes, sometimes just one, to alienate the students to the point of losing their respect and confidence. This is a fatal mistake that can be very costly in the long run.

3. Use the tools that are available – PowerPoint and other technically based instructional media – but don't become a slave to the technology. It is important that you use the technology and that it does not use you. Some students love PowerPoint and the handouts provided by professors because it helps them organize the material but there are drawbacks. Preparation of slides take a long time and those provided as companions to textbooks are often not in the instructor's voice. There have been claims of 10 to 15 hours to prepare a single PowerPoint based lecture – that is just too much time when considering balance, although some say they never prepare again because they have a finished lecture which is also a problem. PowerPoint and other technologies are really effective when used as a guide or outline for taking notes. If the entire class is presented electronically there is a chance that speed will be a problem and that a lot of material will be "covered" without significant depth of understanding by the students. Using the guide or outline model allows for discussions and other interactive events during the class. Again, building classes this way takes time and requires an in depth understanding of the material, but judicial use can result in very good classes when the technology is combined with student-centered activities.

4. Stay away from fad teaching styles, but do use those that make sense. When collaborative and cooperative learning first became the way to go many faculty jumped on the bandwagon and changed their whole style in an effort to be innovative: unfortunately, the "new style" was foreign to students which made the going tough. Moderation when using a new style the first is a good way to determine if it fits your style and that of the students. Some teaching styles are better suited for certain disciplines, and thus, not suited for others. It is highly unusual to see an engineering class sitting on the floor talking about laminar and turbulent flows: however, this is certainly a style that fits other disciplines. This does not mean that there is only one way to teach engineering: rather, it means that engineers should try to match their teaching style to the subject

matter and their student's learning style. Choose wisely since the impact on the students may be reflected in how they view you as a teacher when evaluation time comes. Also, choose wisely because inefficient teaching and changes in style both lead to additional time spent on class preparation – something that can throw off personal balance as well as the balance between student- and teacher-centeredness.

5. Honor office hours and spend time helping students develop the skills necessary to solve problems and to learn. Office hours are by nature very student-centered. They are a good time to get to know students and to evaluate student learning, and in turn, your teaching. It is a time to assess the development and background of students, information that might impact the way the classroom is run. With students in this one-on-one situation, ask what they like in the classroom, how they like the teaching style, what environment they like, and how things can be improved. They will probably say more example problems should be completed: this is an activity that can be student- and team-centered and very useful in assisting individual learning.

6. Include students in research endeavors – this is a great learning mode for good students. In graduate school this is an obvious way to learn and most faculty have experienced this. Student research is also applicable to undergraduate education although it is a little more complicated and requires a level of dedication because students need much more initial training on research methods. This has been very successful at the baccalaureate level and is rewarding for students and faculty alike. Many students who pursue undergraduate research experiences are likely to move on to graduate school and use the experience to learn research methods and get their first papers published. Faculty who sponsor undergraduate research benefit by being coauthors on papers that may not be written without the assistance of these undergraduates: especially in engineering and science disciplines when heavy teaching loads limit research time. This is win-win situation and is certainly student-centered. Here the balance is rewarding to all involved, but there is a time element that must be considered. Nationally, there are organizations such as the Council on Undergraduate Research that are established to assist in setting up undergraduate research by bringing faculty and administrators together to plan for the inclusion of undergraduate research programs.

7. It is important to remember that knowledgeable teachers who are organized are normally successful. Having read hundreds of faculty evaluations, it is clear that lack of organization overshadows all other complaints about teachers. Few teachers are criticized for lack of knowledge since teaching within the discipline helps in this regard. However, even the most knowledgeable teachers who are disorganized in class have a negative impact on the student's learning process. It is amazing how simple organizational skills that are required of our students are not modeled by the faculty when in the classroom.

It is important when establishing balance that the first thing considered is item 1 above, and that as many of items 2 – 6 are incorporated to facilitate success.

Conclusion

The use of student-centered learning techniques is an important way to stimulate the intellectual development of students – but the techniques should not overload the faculty member. The

Chinese proverbs: "Teachers open the door, but you must enter by yourself," and, "Tell me and I'll forget; show me and I may remember; involve me and I'll understand," support the need for alternative methods. We all understand this – use methods that support personal goals of the student and the needs of the faculty.

References

1. R.M. Felder and R. Brent, *Cooperative Learning in Technical Courses: Procedures, Pitfalls, and Payoffs*. ERIC Document Reproduction Service, ED 377038 (1994).
2. Samples, J. W., (2005) "Leadership 102 – Your First Team – The Research Group", 2005 American Society for Engineering Education Annual Conference Proceedings, Portland, OR.
3. Wankat, P.C. and Oreovicz, F.S. (1993). *Teaching Engineering*, New York: McGraw-Hill, Inc.
4. Beichner, R. J., Abbott, D. S., Deardorff , D. L., Allain, R. J., and Saul, J. M. (2000), "Introduction to SCALE-UP : Student-Centered Activities for Large Enrollment University Physics", 2000 American Society for Engineering Education Annual Conference Proceedings, St. Louis, MO.
5. Lowman, J. (1995). *Mastering the Techniques of Teaching, Second Edition*, San Francisco, CA Jossey-Bass.
6. McKeachie, W.J. (1999). *Teaching tips: Strategies, research, and theory for college and university teachers*, Tenth Edition, Boston, MA: Houghton Mifflin.
7. Martinazzi, R. (1997), "Employing the "Partnering" Concept With Student Teams", 1997 American Society for Engineering Education Annual Conference Proceedings, Milwaukee, WI.
8. Martinazzi, R. and Youchak, R., (2005), "T. H. I. N. K. ACRONOYM FOR "TURNING HUNCHES INTO NEW KNOWLEDGE"", 2005 American Society for Engineering Education Annual Conference Proceedings, Portland, OR.
9. Glenn, D., "Matching Teaching Style to Learning Style May Not Help Students", *The Chronicle of Higher Education*, December 15, 2009, http://chronicle.com/article/Matching-Teaching-Style-to/49497/