

Teaching Creativity, Innovation, and Change in the Leaderless Classroom

Donald H. Horner, Jr., Jack V. Matson,
The Pennsylvania State University

Introduction

Creativity: having the power to create; marked by originality; imaginative. *Innovation*: the act of innovating or producing something new or unusual. *Change*: to make different; to alter; to transform.¹ Different concepts? Yes. Related concepts? Definitely. Teachable concepts of particular relevance to engineers? Without question.

Definitional differences notwithstanding, there exists a shared essence which binds notions of creativity, innovation, and change. The essences of these concepts, whether taken singly or in combination, is one of enthusiasm, enlightenment, and engagement that accompanies doing something in a unique, unusual, and different way. Given the positive energy and predisposition to action that these concepts connote, they do not necessarily fit well into established, traditional models of classroom instruction and interaction. The challenge for educators is to develop and employ a method for teaching these concepts in a manner that is consistent with the essence that the concepts share.

This paper proposes that the process of teaching creativity, innovation, and change to engineering students in a university setting must itself be creative and innovative while concomitantly promoting change. The method promoted here is a “leaderless classroom” approach, which requires students to become entirely and *radically* responsible for their own learning. In contrast to traditional modes and styles of teaching, which encourage unenlightened students to remain passive recipients of knowledge imparted by all-knowing professors during the learning process, the “leaderless classroom” casts typical professorial and student roles asunder. The latter assume complete responsibility for the creative, innovative, and change process, to include goal setting and direction, in and out-of-class activities, topics and content studied, learning processes, and student assessment. The result is a classroom culture which recasts typical student-professor interaction and behavioral patterns, engages students, makes students personally responsible for their own learning, and stimulates creativity, innovation, and change.

The paper begins with a description of typical classroom processes and how the leaderless classroom approach differs from this norm. An account of the culture created by the leaderless classroom follows. The paper then highlights observations and results

from the most recent class (i.e., Fall 2000 semester) to utilize this method. Actual e-mail extracts taken from students and instructors illustrate and reinforce findings and provide evidentiary support.

Typical Classroom Processes

Ahh, the typical university classroom - - a setting in which students know their places, professors know theirs, and each group understands the others' roles and responsibilities. Normal. Predictable. Comfortable.

Enter the professor. The acknowledged "expert" in the field; the revered one; the keeper of the truth. Busy and consumed with research and scholarship, the typical professor enters the classroom to impart his or her knowledge to the students. After all, the professor understands "it," and students hope to get "it" from their professor - - the "it" being that body of knowledge covered in the class.

The usual practice is for the professor to issue a syllabus to students. The typical syllabus spells out in great detail what topics will be covered, how they will be covered, when they will be covered, and how students will be evaluated. The syllabus also prescribes which texts or notes to purchase and where they might be procured. Classroom procedures may also be addressed.

Enter the students - - the seekers of truth. They take their seats expecting to be taught. They expect that the professor will teach and that they, the students, will learn. Students expect the professor to have an agenda for learning (aka: a syllabus) and that they will follow the plan.

The shoveling of intellectual knowledge begins. The professor professes. The students listen; they take notes. The professor assigns a task to be completed. The students complete the task. The professor specifies an activity. The students perform the activity. This is the bifurcated world of the classroom: task . . . compliance . . . active . . . passive . . . stimulus . . . response.

The play that is the university classroom is scripted and unfolds in a warmly familiar way.² And, why shouldn't it? It's been rehearsed and choreographed from kindergarten through higher education. The roles are established, understood, and tolerated. This reality that is the typical classroom is a social construct.³ An understanding and acceptance exists about the way things are done. *After all, this is the normal way to learn.*

Where is the creativity, the innovation, and the change in this process? Where is the originality, the uniqueness, and the transformation? Put bluntly, how could one ever hope to learn *anything* about creativity, innovation, and change by using such a starchy process? The problem with attempting to teach a course on creativity, innovation, and change in a "normal" learning environment is that the stereotypical classroom is void of the very essence of the concepts being taught.

Breaking the Script: The Leaderless Classroom

The leaderless classroom is a minimalist approach to maximizing the understanding and learning of creativity, innovation, and change. It is also an experiential approach. Students are forced to create, innovate, and change while also learning about these concepts. As alluded to earlier, traditional professorial and student roles are cast aside in an attempt to foster a feeling of a new, unique, and somewhat daunting learning environment.

Professors provide a rudimentary syllabus (see Appendix 1) to the class, and then quickly assume the mantle of mentor, coach, and / or advisor. What happens next is completely up to the students. Students rule in the leaderless classroom, but they don't necessarily like it. In the leaderless classroom, there is no shoveling of intellectual knowledge from professors to students. There is no shoveling of any kind - - unless students decide to shovel. At first students embrace the notion of not being spoon-fed; these feelings quickly fade when they realize that there is work to be done, that they must define the nature of the work, and the responsibility is almost entirely theirs.

The culture created by this environment embraces intelligent fast failure⁴ as a means of knowledge acquisition. Well intentioned actions aimed at pursuing knowledge which nonetheless result in failure come to be perceived as *good*; encouraging thoughtful rapid testing of ideas and failure is perceived as *better*; and learning from failure is perceived as *best*. Learning activities tend to be hands-on, participative, and team oriented as students set out to understand the creative, innovative, and change process.

Life in the Leaderless Classroom: Observations and Results

1st Observation: Typical student-to-student and student-to-professor interaction and behavior patterns change.

Case-in-point: The intensity and frequency of in-class and out-of-of class contact among students and between students and professors.

Time period: First third of the semester on.

Students received the course syllabus in advance via e-mail. It stated that the course would be student-directed and run, and that the instructors (i.e., Donnie Horner and Jack Matson) would serve only as mentors and coaches. So for the first class Donnie and Jack entered the classroom, sat down, made no move to assert authority, and waited for students to take control. Jack summarized what happened in that class and in the subsequent one. (Note: In this section forward e-mail messages will be used as evidence of observations. E-mail messages are denoted by the different font.)

Jack: I was surprised, but not shocked, at the beginning of the first class when it took 15 minutes for someone (Greg) to ask whether we were going to do anything. I had made it a point to e-mail the syllabus to students a week in advance and then repeat the effort several more times. I got the

distinct feeling that neither the syllabus nor the text had been studied. The second class period, after all introductions had been made, degenerated into the production of ideas followed by mild put-downs. There were very few follow-ups to ideas, and individuals preferred to offer put-downs and alternate ideas.

This was supposed to be an action class, where the high level of activity, as defined by the students, creates change. This looks like the typical college student routine of coming to class without much or any preparation, hoping something will happen. And if it doesn't, so what? If this were war, it would be over and the losers would be dead. This is a different kind of war - - one of opportunity. They are squandering the potential of this class.

Donnie said at the end of class: "We love you all so much that we are willing for you all to die so you can rise from the ashes, so to speak." The principal goal of innovators is not perfection but originality, the opening of new frontiers. We need to let our preconceptions of the way things need to be DIE, and start the experiments now.

Sarah: So why am I here? I am here because I want to learn, experience, and become a better person as a result. That is why I am here at Penn State. I took the class because I wanted to expand my horizons. I want to have more confidence in myself because I think that ultimately that will help me a lot in the leadership aspect. I want to be in charge of my learning and get into things that I am interested in. I thought it would be a great opportunity to experience the uncertainty that comes with not having a preset direction and eventually overcoming that to complete something that I am proud of. I also want to learn more about group interaction and how different people react in group situations.

Dan: I don't know how you guys feel, but I feel disappointed in how the class is going. Frustrated and confused feelings will only grow if we do not have some sort of plan about how we are going to accomplish things in the class. It's difficult. So I suggest taking the bull by the horns [sic] and not pitter away the next class. I suggest everyone come to class with what they want to accomplish for that day. First things first, as much as I hate limits, I think we need a time limit on issues before we start. So I hope that if we can set a limit, we can continue moving forward and not around in circles like it seems we are doing now.

Despite these comments, the students continued to argue about what to do and how to progress. The students were required to keep portfolios. The intent of the portfolios was for students to write about knowledge acquired in the course and how they could

integrate their experiences with this newly acquired knowledge. Donnie read the portfolios and made the following observation:

Donnie: Most of the work is of poor quality - - more diary-like than analytical, more check-the-block than reflective. This saddens me. I wrote these comments most often on the journals: "nice diary, very observational . . . but . . . very little substantive reflection . . . void of analysis." The journals tell me that we're doing the right thing with regard to stepping back and letting the students take responsibility for the course. Most students offer that they know something needs to be done . . . but they opt to wait for someone else to do "it" - - whatever "it" is. Well, the house is on fire, they recognize it, they choose not to do anything about it . . . so I suggest we let them burn, baby burn.

The interactions became testier as shown in the following exchange when one of the students (i.e., Min) announced to professors and fellow students that he would not be able to attend class.

Min: I have some bad news. Me, Min, your ever loving Korean, will not be there today. I have an exam tonight but that's not why I'm not coming. I have to make up a quiz before the exam which I am heavily screwed for [sic].

Jack: Will the excuses ever end? When will you start exhibiting leadership? Drop the course given your current attitude. Time is running out on you. The class needs people who are serious about being involved.

Min: I have nothing but a good attitude for this class. Maybe, right now, I am confused on how I can contribute as a leader with the projects at hand or projects not at hand, but I will do what I can. One other thing, I would rather get an "F" than drop this class. Also, if there are any of you that consider yourselves in the same situation as I am, please e-mail me. I have seen groups of slackers do amazing things. All we need is a spark, let us come together and rub sticks.

Jack: Some of you feel I was harsh to Min in my response to him. Although I singled him out, I believe some of the rest of you have also not accomplished anything substantive and strongly need to consider dropping the course at this time. Leadership demands commitment and responsibility. If you are not willing or capable of responding to its challenges, now is the time to move on. The semester is half over this week. You know who you are. Donnie and I have open doors to give you straight feedback. Come and see us if you feel the need. The demands of the course are accelerating. There is precious little time to turn yourself around if you have

been on the sidelines. It is time to make a decision to lead, follow, or get out of the way.

Greg: Jack and Donnie: I am writing to you to ask you to step away from the class.

And we did - - at least for a while. Face-to-face interactions were frequent. The students, for the most part, continued to want us to give them direction about what to do. We refused. When we commented on their deficiencies in taking control, they fought back. The result was a stalemate with fairly open communication channels.

2nd Observation: Students are more engaged and increasingly take personal responsibility for their own learning.

Case-in-point: The Tick Project.

Time period: Second third of the semester on.

The class was at this point four weeks into the semester and suddenly Megan offered an idea for a service leadership project (a requirement for the course) having to do with Lyme disease awareness. She had contracted the illness at birth and was committed to letting everyone know about its perils.

Megan: I have an idea, so everyone let me know what you think. I was thinking we could build a GIGANTIC tick (like at least 20 feet tall or something). We could put the tick on the Old Main lawn and that would certainly attract attention in a way that people would be educated. We could put literature in the legs. Perhaps the Collegian [student newspaper] would cover it. Further, we can build it to be collapsible, so we could take it to Harrisburg and [Washington] DC to lobby. What do you think? I just want to do something that will shake up society.

The students decided to inform the President of the University of their idea:

President Spanier -

There's an exciting issue at hand that was created by some of the students in STS 497B (course titled "Creativity, Innovation, and Change"). STS 497B is a 3-credit capstone course for the Engineering Leadership Development Minor that is completely student run. The students are 100% responsible for their lessons learned as well as the level of success that is reached from the course.

Did you know that Pennsylvania has the third highest incident rate of Lyme disease in the United States? With an infected classmate (in STS 497B) and friend, we are determined to spread awareness throughout the campus and beyond. Spreading awareness is extremely important, as you already know from spreading alcohol awareness campus wide. Would you be willing to meet with our class to further discuss and share in the excitement with us?

This could be a BIG thing! Please contact us and share your thoughts freely. Our class time is Tues / Thurs 1615 - 1730 hrs, but we could modify our schedules if there is any other time that is more convenient for you. We would love to meet with you in person as soon as possible. You can contact us with the date and time by replying to my email address.

University President Graham Spanier responded to the students' letter:

Subject: Fwd: Student Class

I did see the story in the CDT [local newspaper], and I thought it was a great topic for a class. Unfortunately, I'm so heavily booked this semester that I couldn't possibly visit your class. I do appreciate the invitation, however. Good luck with the seminar. I do admire your efforts to create awareness of an important issue.

In this middle part of the semester, various students went in and out of the "Tick" team. The team had a core of four students: Megan, who was totally committed to and passionate about the project; Sarah, a graduate student who took on the role as the field general; and Jason and Chad, both of whom were loyal teammates. Megan pushed for greater participation from the rest of the class:

Megan: You know, it's NOT TOO LATE for the ENTIRE class to adopt Lyme Disease Awareness as its goal. How cool would it be to organize a rally (complete with the gigantic tick) ROWDY enough to make Spanier and all those stupid stuffed shirt administrators take notice?? And wouldn't it be awesome to overhear people in your classes, or walking to class say "Yo, what's up with all this Lyme stuff?" And you can either sit back smugly or join in their conversation and say "I did that!!!" Think about how BIG this can be!! Lyme Green Ribbons around trees, chalkings on the sidewalks, the campus plastered in literature, fliers, awareness pins and t-shirts. This is just the beginning!! Two weeks is plenty long enough to TOTALLY ROCK the campus!:) I can't wait!!

Sarah: Megan is right. IT IS NOT TOO LATE to help us with the Lyme disease project! We gave you the list of things that we wanted to accomplish! There is lots to do and if everyone pitched-in and helped we could accomplish a lot and really make a splash here at Penn State. Every person makes a difference, like I pointed out with Dave, and that is what I believe in. I know, as well as Megan knows (if any of you ever read her signature) [sic] "Never doubt that a small group of thoughtful committed citizens can change the world; indeed, it is the only thing that ever does." -Margaret Mead. And one person CAN and DOES make a difference because if you tell just one person, that one person is now more knowledgeable than before and you have made a difference in his/her life. And, who knows!

The passion, energy, and commitment of the "Tick" team were infectious and others joined. However, about half of the class continued to remain on the sidelines. Ultimately, the students constructed a giant tick and placed it in a prominent location on campus with several more of the previously uncommitted making significant contributions.

3rd Observation: Creativity, innovation, and change eventually occurs.

Case-in-point: Grades.

Time Period: Last third of the semester.

No issue was more important to students - - particularly the slackers - - than grades. Josh openly expressed the attitude of the slackers:

Josh: Of course you all remember that one of my class goals is to get "an easy A".

This attitude did not go unacknowledged:

Jack: I look forward to what you all do about evaluation and grades. The process will force everyone to focus on the goals of the class and what is important, and what is not so important. Warning: do not let the grades discussion become what the class and course is about. It is only the response to one of the three critical questions you must answer, which are:

1. What are you going to do? (goals)
2. How are you going to get there? (process)
3. How do you know you are getting there? (metrics, evaluation, grades)

Donnie made the following suggestion:

Donnie: Jack and I would like to make ourselves available to you on an individual basis and provide each of you with our unvarnished feedback regarding our view of your performance thus far in class. The performance appraisal would potentially include our observations and perspective of your behaviors, motivation, and performance as they pertain to participation in this course. You will have to decide if this initiative is of any value to you. If you want us to do this, fine. If not, fine also. Let us know if you think this is a good idea. If it's not, we'll punt it away.

Most students took advantage of the opportunity to receive feedback from their instructors. Interestingly, it was the middle-third and upper-third performers who tended to seek feedback. Low-performers tended to avoid feedback. We found this phenomenon both strange and predictable but nonetheless disappointing. Further discussions about the value of private, candid feedback ensued with no progress, and Donnie expressed his dismay:

Donnie: I'm an optimist. Always have been. Yet, I'm confronted by the stark reality that [several students] have failed to progress in a class and in an environment in which the only mission was to decide what to do, how to do it, and how to measure what was done. All of their encumbrances to progress have been SELF-imposed. And we wonder (not!) why our world has plagues, and wars, and strife when all the tools are available to avoid it. Real societal and global implications here.

In the last several weeks of the semester, however, students made remarkable progress regarding the grading process and how grades would be assigned. The debate was spirited. After much public and private acrimony, students decided that grades would be split into thirds: one-third self-assessment, one-third peer evaluation, and one-third from professors. The class directed that each student would give a ten minute presentation to the rest of the class regarding his / her role in class and outline their assessment about the quality of their own performance. As one might expect, some of the student presentations were self-serving. Most were not.

The least self-serving assessments were provided by the members of the "Tick" team - - Megan, Sarah, Chad, and Jason. Each used their presentation time as a forum for praising other team members. Knowledge acquired regarding creativity, innovation, and change was directly attributed to the contributions of other team members. This finding flies in the face of the self-serving attribution bias⁵, which suggests that overwhelmingly positive outcomes tend to be attributed to internal rather than external factors.

Final Thoughts

The view proposed here strongly suggests that the leaderless classroom is a methodologically sound means of creating an environment which promotes learning about creativity, innovation, and change. The leaderless classroom is not "the" method; it is "a" method. Though this paper does not purport that other approaches cannot be effective, it does proffer that traditional attempts fail to establish the necessary conditions and proper framework for substantive learning about creativity, innovation, and change.

Make no mistake: the leaderless classroom is a radical approach. It makes students almost entirely responsible for their own learning. The approach proves uniquely useful and effective because of its tripartite nature. Students must take charge of the content studied and learning process employed while also experiencing what it is that they're trying to learn. The experiential component of the leaderless classroom proves to be a boon to inducing the requisite energy required to initiate and sustain creativity, innovation, and change.

Anecdotal evidence suggests that the differing roles emblematic of the leaderless classroom prove extraordinarily challenging and frustrating for both students *and* professors. The frustration is a byproduct of being immersed in unfamiliar roles - - uncharted academic territory that it is. The frustration becomes a stimulus for student

discussions and activities⁶, and the activities ultimately yield meaningful actions aimed at actually learning what it means to be creative, to innovate, and to change.

References

¹Webster's II: New Riverside University Dictionary. Boston: Riverside (1984).

² A social psychological script is a conceptual representation of a sequence of events that has routinely been encountered by a person. See R. P. Abelson, "Psychological Status of the Script Concept," in American Psychologist (1981), volume 36, p. 715-729.

³ For a more thorough discussion of "the social construction of reality," see Erving Goffman's Strategic Interaction (New York: Ballantine Books (1969)).

⁴ "Intelligent fast failure" is a term first coined by Jack Matson. See Jack Matson, The Art of Innovation: Using Intelligent Fast Failure, University Park, Pennsylvania: The Pennsylvania State University Press (1991).

⁵ See Morris Zuckerman's "Attribution of Success and Failure Revisited" in the Journal of Personality (1979), volume 47, p. 245-287.

⁶ Fritz Heider's "balance theory" and Leon Festinger's "theory of cognitive dissonance" both suggest that the mental frustration and anguish that accompanies being in an unfamiliar role or situation stimulate meaningful actions to reduce tension. See Fritz Heider, The Psychology of Interpersonal Relations, New York: John Wiley (1958, and Leon Festinger, A Theory of Cognitive Dissonance, White Plains, NY: Row, Peterson (1957).

DONALD H. HORNER, JR.

Donnie Horner is an Associate Professor in the College of Engineering at The Pennsylvania State University, and serves as the Director of the college's Engineering Leadership Development Minor. Dr. Horner co-teaches the capstone "Creativity, Innovation, and Change" course and other leadership and management courses. Dr. Horner received a B.S. degree in General Engineering from West Point, his M.S. in Transportation from the Massachusetts Institute of Technology, and M.A. and Ph.D. in Sociology from Stanford University. He actively consults on a variety of leadership and transportation systems issues.

JACK V. MATSON

Jack Matson is Professor of Environmental Engineering at The Pennsylvania State University. He was Director of the Leonhard Center for Innovation and the Enhancement of Engineering Education at Penn State, and in that role was a stimulus for the creation of the Engineering Leadership Development Minor in the College of Engineering in 1995.

He originated the Creativity, Innovation, and Change course as the capstone in the Minor and has co-facilitated it. He also teaches the Technology Based Entrepreneurship course as well as environmental engineering capstone courses. He is the author of Innovate or Die.

Appendix 1: Sample Syllabus

STS 497B: Creativity, Innovation, and Change

Fall, 2000
208 Hammond
4:15-5:30 TR

Dr. Jack V. Matson, Professor of Environmental Engineering
Dr. Donnie Horner, Director of the Engineering Leadership Development Minor
Office: Matson: 215a Sackett; Horner: 213-E Hammond
Email: jvm4@psu.edu, dhhjr@psu.edu
Office Hours: By appointment
Text: Innovate or Die by Matson (at Penn State and SBS, \$16.95), or Is Intelligence More Important than Knowledge? by Matson and Galishnikov (an eBook through mightywords.com, \$9.95)

- I. Course Goal: To create, innovate, and change through the application of leadership principles.
- II. The Process: how you are to learn:
 - A. By determining what you are going to do (goal setting)
 - B. By figuring out how you are to achieve your goal (the process(es))
 - C. By developing measures of progress (metrics)
- III. Metrics: how you are doing
 - A. Grading, four key elements:
 1. Class determined project(s)
 2. Professional portfolio.
 3. Attendance
 4. Peer evaluation.
- IV. Responsibilities of the Class
 - A. Formulate the course outline, context, and content.
 - B. Facilitate class activities and discussions.
 - C. Determine evaluation (grading) criteria
 - D. Involve elements of service leadership.

“It is not so difficult to learn the new. The real difficulty is forgetting the old; transcending one’s accepted views and suddenly seeing things from a different angle.”
- - Albert Einstein

“The principle goal of education is to create humans who are capable of doing new things, not simply repeating what other generations have done, but people who are creative, inventive, and discoverers.” - - Jean Piaget