Creating an Entrepreneurial Culture: Breaking the Disciplinary Boundaries

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Abstract

This session will describe a multi-disciplinary approach to teaching entrepreneurship to a diverse group of students, i. e. Engineering and Human and Organizational Development students. A course has been designed to provide them with an overall understanding of entrepreneurship and to prepare them for developing a mindset for thinking creatively. Traditional disciplinary boundaries are broken, as students are freed to innovate and to think creatively about future ventures. The course is targeted at students who would like to create their own business and they are given the opportunity to develop a business plan from one of their own ideas. Students from entirely different programs, like Human and Organizational Development and Engineering, are encouraged to work collaboratively on joint projects. Opportunities to share their ideas with other entrepreneurs are made possible. The course is meant to teach students how to dream about new ideas and how to take new business ventures to the marketplace. In part, entrepreneurship is defined as a "state of mind -- artful, insightful and innovative mentality rather than a business management or administration concept." It is a way of perceiving and exploiting opportunity wherever it is found. Students are given the opportunity to explore markets for their own ideas and to conceptualize a business enterprise for such markets.

A wide variety of teaching strategies will be discussed in this session, including lecturettes, video clips, guided discussions, peer group learning, telephone/video conferencing, outside entrepreneurial speakers, online searches and comprehensive webbased interactions. Online presentation of materials will be discussed, and heavy emphasis will be placed upon the use of technology in the learning environment. Learning concepts developed by Clouse and Goodin related to "just in time" teaching and "whole-part-whole" techniques will be presented.

I. Introduction

When a young child, six or seven years of age, enters either kindergarten or first grade, they do so in a multi-disciplinary society. Students come from all walks of life, from many different cultural, economic and religious backgrounds. They all have their eyes wide open and with their own personal agendas. They are excited, creative, innovative and perhaps mischievous. The teacher has the enormous job of corralling all of these interests, backgrounds and energies into some type of productive learning environment. To make this miracle happen, the teacher must be multi-disciplinary in approach and

able to cope with many different and opposing viewpoints from this young herd of children. Somehow, during the first two or three weeks of school, she is able to perform a miracle and to arrange a multi-disciplinary teaching environment. Order soon grows out of this chaos and students are settled down to learn a prescribed curriculum based on a schedule and curriculum established by some noted educators. There is enormous energy, creativity, innovation and desire to learn within this classroom. There may be also conflict between students of different cultures, religion and economic backgrounds. After the first six weeks of classes, students are forever changed. They have become accustomed and have accepted a recommended way of learning¹. The teacher is required to integrate Math, Science, Social Studies (including History and Geography), Language Arts, Physical Education, Art, Music and all of the other known subjects taught in elementary school.

As the student progresses through his or her elementary school experience, he or she is taught in a multi-disciplinary environment where some attempt is made to integrate subject areas across interest areas and cultures. Somehow, by the third grade, many students have lost their creativity, their innovation, and to some extent, their desire to learn new and exciting ideas. They've learned that they are mere "products" of an educational system modeled after the factories of the Industrial Age^{2,3}.

By the time the student reaches high school, he or she is placed in a curriculum composed of Mathematics, Chemistry, Physics, Social Studies, Business, English, History and many more modern day titles. Students are expected to attend classes and to perform within the structure of the classroom learning environment in a particular course. Seldom do the concepts taught in English coincide with History and also seldom do concepts taught in Math, Chemistry, and Physics interrelate. Courses are taught as a unique and stand-alone class. Much of the wide-eyed curiosity brought to the schoolhouse on the first day is now gone. Students are taught discrete, integral concepts with very little attachment to the learning style or framework of the learner. Therefore, most ideas are taught in an abstract way, with students trying to memorize enough information to pass the six-weeks exam and the final exam at the end of the year. Rote memory is the order of the day.

By the time the student reaches the university level, he or she has learned how to "work the system." Courses quite often become more structured, focused upon a single domain or discipline, and so may be termed "uni-disciplinary." For the sake of explanation, let's imagine four illustrious professors, Drs. Volt, Outerspace, Thermostat and Gene. Dr. Volt is an internationally known electrical engineer who teaches a course that assumes a preparation in mathematics before entering the course. The mathematics class, of course, was taught primarily as a uni-discipline. Problems at the end of the chapter were solved with little or no relationship with the framework of the learner. Dr. Outerspace, well-known professor of space technology, teaches a course in space travel, and assumes that the student has a working knowledge of the solar system. Dr. Thermostat teaches a course in thermodynamics, and Dr. Gene teaches a course in biomedical engineering with emphasis on genetics. Textbooks from nationally known publishers are used, which in turn are written primarily by professors who teach uni-disciplinary approaches to learning. Concepts and ideas are taught in a scheduled manner, regardless of where the student is in his or her own learning schema⁴.

To perpetuate this type of learning environment, universities are arranged by schools and by departments. In these schools, each department is responsible for its own physical existence. Sometimes the term "every tub on its own bottom" is used to explain the need for each department to generate its own revenue. Unless some outside force intervenes, seldom do professors move across departments, and almost never move across schools. For example, seldom does one see a course in ethics or philosophy made available for the engineering and/or education students. That is not to say that there are not some attempts across the country to integrate curriculums within departments and across schools. However, this is the exception.

In addition to this organizational structure, there are other forces at work which prevent interdisciplinary collaboration. For example, there is always exists some element of territoriality in universities. Department Heads and Deans sometimes protect their students by requiring them to take only courses in their department and/or school. Tuition frequently follows the enrollment of the student, and therefore is a deterrent for a school or department to encourage their students to enroll in courses in other departments or other schools. Finally, there is always a reluctance to change on the part of faculty members who have become accustomed to doing things a certain way. Oftentimes, due to these forces of politics, economics and inertia, an interdisciplinary approach to education becomes essentially impossible⁵.

Given all that we know about the existing structure of the educational system in this country, several questions emerge. How do we re-create the learning environment of the first grader who came into his or her classroom years ago? How do we instill in the learner the excitement and the curiosity associated with a creative learning environment? How do we re-energize the student? How do we re-introduce innovation, creativity and entrepreneurial thinking? These are the questions that led us to the development of a course in Engineering Entrepreneurship.

II. Outside Forces Cause Change

First, it should be noted that, although we could see a need for a different approach to education and were troubled by the apparent failure of the system to prepare students for the demands of the "real world," there was little that we could do about it by ourselves. In our case, we were fortunate to secure the support and encouragement of the Coleman Foundation. The Foundation stresses the importance of developing entrepreneurial thinking in students, and sponsors programs across the nation for that purpose. We are in our fourth year of association with the Coleman group, and have been able to do with their support what the university has been unwilling to begin.

III. Whole-Part-Whole Teaching and Learning

A key part of this curricular design is that of a "whole-part-whole" instructional approach⁶. Rather than beginning with the parts and expecting students to create a meaningful "whole" on their own, the instructor presents the whole scenario first, which establishes the context within which the student will operate. Then student groups "plunge into" the problem, take it apart, and put it back together into a new "whole," one which represents a solution to the problem.

There is ongoing debate among educators as to whether it is more effective to teach from "part to whole" or vice versa. Those who advocate the former insist that it is preferable to break complex concepts down into their simplest parts and to teach those parts⁷. Once students have mastered the components, they are expected to put the pieces together to make the whole. As stated earlier, this practice dominates a student's school life from the beginning.

Let's consider an example of this type of learning theory in action in the typical middle school math class, keeping in mind that these are the students who will eventually populate our colleges and universities. In the middle school math class, the teacher presents the concept of percentages by placing a formula on the board. He or she then breaks the formula down into its simplest form and teaches each concept separately. After the students have seen the formula in action, through demonstration by the teacher, they are given a worksheet with several practice problems. Every day thereafter they are given new practice problems to work, and at the end of the week they are given a test. They should perform fairly well, provided that they worked the practice problems correctly and the test format is the same as the drill. They have "learned" percentages. Or have they? Too often, it appears that they have not. In fact, it seems that the instruction began and ended at the "middle" of the process, in the "part" phase of the whole-part-whole continuum. Such instruction is doomed to failure if one believes, as we do, that effective instruction demands a grounding in the concepts of situated cognition and holistic learning. To reinforce the importance of the process that we used in our course design it would be profitable to discuss briefly these supporting elements, which are a part of what we call the "whole-part-whole" model of learning and teaching.

IV. Situated Cognition

People generally learn new information in the context in which it is used⁸. This suggests that students may be drilled to the point that they will be able to do well on a test, but that they will not retain the knowledge over time or be able to apply it elsewhere⁹. According to the concept of situated cognition, it is imperative to provide students with contextual practice in order to insure that they really "know" a concept. Knowledge that is unused (in context) quickly becomes "inert" and is no longer available to the learner. To use the example of the middle school math class, the students may very well learn

how to work the percentages formula on the board and on the test, but they will not know how to calculate a margin of profit in real life!

In order to bridge this gap between traditional classroom learning and real–world applications, educators must present concepts within a situational, reality–based context¹⁰. In fact, true learning, according to Brown, et. al., requires the adoption of the domain's culture. In order to solve mathematical problems, one must learn to be "a mathematician." To be a mathematician involves more than just learning formulas from the blackboard. A student must adopt the culture of the mathematician, to a certain extent. In order to immerse them in the culture of a domain, teachers can employ the idea of cognitive apprenticeships. Modeled after the craft apprenticeships, this approach allows students to use knowledge in truly "authentic" ways. For example, if students learn mathematics in authentic settings, such as in setting up a business, they are more likely to begin thinking "like a mathematician," or to see the world the way a mathematician would see it. In addition, Brown, Collins, and Duguid argue that there is a transfer of creative problem-solving ability, in that students will begin to solve other problems "mathematically."

V. Holistic Curriculum

The Cognition and Technology Group at Vanderbilt University¹¹ has expanded upon the idea of situated cognition through a model called "anchored instruction," which embeds mathematical and science concepts in an adventure learning series called "Jasper Woodbury." The idea of "macrocontexts," holistic scenarios which allow students some immersion into the field being studied, are employed. The adventures are presented in videodisc format, which appeals to a broad range of senses and allows students to view the actual problem without the distraction of another person's interpretation. Further, the videodisc can address concerns quickly through the use of random access. It generates more interest, resulting in better stories, more use of historical information, and more research into related areas. Key concepts may be revisited, and the use of "embedded data" lets students generate their own sets of problems, a feature which reinforces the notion that there are often multiple solutions to a problem in real life.

VI. Connecting With The Learner's Framework

Our goal has been to create an "entrepreneurial culture" at the university level by encouraging students to "think like an entrepreneur," much as Brown, et. al. promote mathematical problem solving by the establishment of a "mathematician's" culture. Using the learner's ideas, we attempt to develop a multi-disciplinary entrepreneurship case teaching independence, personal freedom and working outside structured environments. This instructional design gives us the ability to begin with the "big picture" (the "whole") as it relates to the student. Once the connection to student interest has been established it becomes relatively easy to teach the kinds of concepts and skills related to real-world productivity¹².

Our first approach to developing the interdisciplinary concept and implementing the teaching strategy of "whole-part-whole" began in 1997 when we authored courses in entrepreneurship in the School of Education at Vanderbilt University. The primary focus of the graduate course was to teach administrators of all levels to think entrepreneurially. Our second approach was to develop and offer a course at the undergraduate level, entitled "Creativity and Entrepreneurship." This course was offered to a group of students in Human and Organizational Development enrolled in the School of Education at Vanderbilt. Both the graduate and undergraduate courses were available for students throughout the university to enroll. However, in most cases students from the School of Education were the only students to enroll in the classes. More than 100 students were enrolled in the courses in the first effort.

During the summer of 2000 we received a second grant from the Coleman Foundation to research the interest at the university level in entrepreneurship education and to develop a cross-disciplinary platform where interest was expressed. Invitations to become involved in the Entrepreneurship Forums were issued to all Deans at Vanderbilt University and selected Department Chairs and other Faculty Members. The Schools expressing the most interest included the School of Engineering, the School of Nursing and the School of Law. All three Schools identified faculty members who may be interested in working with us on this endeavor. However, the first and strongest response came from the School of Engineering. During the fall semester of 2000 the course in Creativity and Entrepreneurship was offered in two sections. The Associate Dean in the School of Engineering announced the class to engineering students and indicated that they could receive appropriate credit for taking the course. Announcements were posted throughout the entire campus concerning the course title, dates and times. The faculty member who taught the course met with several Engineering classes to briefly describe the course and to invite interested students to enroll. A limited number of students expressed interest in this arrangement. The announcement itself, a professor from another School attending the opening session of classes, and the opportunity to take a course outside the School of Engineering, all were factors that were somewhat foreign and perhaps frightening to some of the Engineering students. Students sometimes find it more comfortable to continue to take classes in the environment in which they have grown up during the past few years. The students who did take the entrepreneurship class found it to be extremely interesting and exciting for them. They were able to take their ideas and move them to a marketable situation.

While this approach has had limited success, the Associate Dean of the School of Engineering suggested a new format which is being implemented this spring. A number of one-hour seminars are being offered. We were privileged to be able to propose the type of learning environment that we have outlined in this paper, and it was accepted by the Engineering Curriculum Committee. The focus of the course is to use the "whole-part-whole" teaching strategy and to have students identify a particular product, process or idea and to help them move that idea into a business applications concept.

VII. Purpose of the Course

The purpose of the course is stated below:

The freshman seminar entitled "Engineering Entrepreneurship" is designed to provide students with an overall understanding of entrepreneurship and to prepare them for developing the mindset of thinking creatively. Targeting students who would like to create their own businesses, it is meant to teach students how to dream about new ideas, and how to take new business ventures to the marketplace. In part, entrepreneurship is defined as a "state of mind--an artful, insightful and innovative mentality rather than a business management or administration concept." It is a way of perceiving and exploiting opportunity wherever it is found. Students will be given the opportunity to explore markets for their own ideas and to conceptualize a business enterprise for such markets.

VIII. Course Objectives

The course objectives are as follows:

- To develop new and interesting ways of thinking about engineering applications.
- To investigate future trends in a world environment and to identify specific needs or new entrepreneurial ventures.
- To connect Engineering students with Human and Organizational Development students to develop cross-discipline discussions.
- To conceptualize and develop a prototype for a new business venture.

IX. Course Outline (Topics)

The following information is a part of the course syllabus and will provide the reader with more details about how we have structured the class.

Assignments for Grading and Important Dates

Topic & Assignments	Due Date	Points	% Grade

I Building A Background And Understanding Of Entrepreneurship

Topic 1 - Introduction	January 16	N/A	0
Introduction of Professors and Assi	istants		
Introduction of Students			
Teaching Strategy For The Class			
Assignments			
Introduction to Prometheus			
New Way of Thinking			
Purchase Textbook			

Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition Copyright © 2001, American Society for Engineering Education Assignment #1 January 23 Read Lambing & Kuehl.. Be prepared to discuss questions at the end of the chapter and apply to yourself when appropriate.

Chapter 1 -- Entrepreneurship Today

Chapter 2 -- The Entrepreneur

Chapter 5 -- Business Growth and the Entrepreneur

Assignment #2 January 30 10 10 Develop a list of 5 trends that you think will happen in the next 20-30 years. You may select industries from the following list or select your own. Use the Internet to see what you can find in your area. Come prepared to discuss in class. No url's are available at this time for these topics.

Medicine	Sports
Advertising	Automobile
Airlines	Aircraft
Transportation	Technology
Computer	Utilities
Fashion	Publishing
Television	Space
Food	Clothing
Retail	Heavy Equipment
Housing	Agriculture
Internet	Government
Education	Entertainment
Investment	International
Europe-One Currency	Travel
Europe-One Currency	Travel

Assignment #3 April 24 10 10 Students are encouraged to use our website at http://entrepreneurship.vanderbilt.edu for new ideas and support information. Some sites are:

<u>News Outlets</u> New York Times Washington Post USA Today Entrepreneurmag.com Entrepreneurial Edge Online Nashville Business Journal

<u>University Programs, Other Schools, Foundations</u> Babson Entrepreneurial Review Frontiers of Entrepreneurship Research Entreworld.org Ewing Kauffman Foundation Coleman Foundation Edward Lowe Foundation

Students should visit the site at least 10 times during the semester. The honor system will be used for the number of times used. A one-page, double-spaced paper is required at the end of the semester. The site is still under development and we will put other links on as time permits. Please give us sites that you find of interest.

II Seeing the World At 30,000 Feet January 30 **Topic 2 - Worldwide Projections** Lecture and Handouts **Topic 3 - Thinking Creatively** Developing Passion For Your Own Ideas Assignment #4 February 6 Read Lambing & Kuehl, Chapter 7 - New Product Development. Assignment #5 February 6 10 10 Develop a list of 10 new engineering ideas that you think may happen in the next 10 years. Use your own knowledge and experience base. You may also use the Web to find out new ideas or talk with other people. These should be typed. Be prepared to discuss in class. **III** Exploring New Opportunities February 13 Topic 4 - Stadium Development **Outside Speaker** Video Assignment #6 February 20 Read Lambing & Kuehl, Chapter 9 - Starting A New Business. Topic 5 - Review of Students' 10 New Ideas **IV** Business Plan Components February 27 Topic 6 - Overview of Business Plans March 3-11 Spring Break March 13-20 Assignment #7

Read Lambing & Kuehl, pp. 131-270. (Read for discussion only.)

Assignment #8 March 20 20 20 Select three of your best ideas from Assignment #5 and develop a one-page (typed, double-spaced) description of each. Post the three ideas on Prometheus (post as "files").

Special Event - Entrepreneurship Conference, Albuquerque, NM March 30-31

V Applying Entrepreneurship Principles To Your Ideas

Topic 7 - Group DiscussionMarch 27Students will be placed into groups to discuss their three ideas. Each student willselect their one best idea.

Assignment #9 April 3, 10, 17, 24 20 20 Each student will develop and deliver a 5-8 minute PowerPoint Presentation on their one best idea. Feedback will be given to each student from professor and colleagues.

VI Final Product

Topic 8 - A New Venture Is Born!

Assignment #10 April 27 30 30 Each student will develop a five-page feasibility plan. Outline for the plan will be given in the class.

VII Entrepreneurship Forums Students will be invited to attend a series of forums during the semester. Dates, times and place will be announced later.

TOTALS

100 pts 100%

X. Readings and Web Site

A textbook is required and readings are assigned. Students are also required to search the Internet for current information and to support their work with theories and applications. The following is a list of references used and web sites.

Bangs, D. H., & Pinson, L. (1999). <u>The Real World Entrepreneur Field Guide</u>. Chicago, IL: Upstart (ISBN 1-57410-113-7)

Frieberg, K., & Frieberg, J. (1996). <u>Nuts! Southwest Airlines Crazy Recipe for</u> <u>Business and Personal Success.</u> Austin, TX: Bard Press. (ISBN 1-885-167-18-0)

Clouse, R. W. (1997). Entrepreneurship Education for the 21st Century. In Canjemi,

J. (Ed.), <u>Psychology: A Journal of Human Behavior, 34(1), 36-40.</u>

Clouse, R. W., & Miller, R. (1996). Entrepreneurship: Views From Educators and Business Executives. In Canjemi, J. (Ed.), <u>Psychology: A Journal of</u> <u>Human</u>

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- Allen, K. (1999). <u>Growing and Managing: An Entrepreneurial Approach.</u> New York: Houghton Mifflin.
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- Epstein, R. (1997). Creativity Games for Trainers. New York: McGraw-Hill.
- Isachsen, O. (1996). Joining the Entrepreneurial Elite: Four Styles to Business Success. Palo Alto, CA: Davies-Black.
- Lambing, P., & Kuehl, C. (1997). <u>Entrepreneurship.</u> Upper Saddle River, NJ: Prentice Hall.
- Levinson, J. C. (1997). <u>The Way of the Guerilla: Achieving Success and Balance</u> <u>as an Entrepreneur in the 21st Century.</u> Boston: Houghton Mifflin.
- Miner, J. B. (1997). <u>The Four Routes to Entrepreneurial Success</u>. San Francisco: Barrett-Koehler.
- Robinson, A., & Stern, S. (1997). <u>Corporate Creativity.</u> San Francisco: Barrett-Koehler.
- Shepherd, D., & Shanley, M. (1998). <u>New Venture Strategy.</u> Thousand Oaks, CA: Sage.

Stolze, W. J. (1996). <u>Startup: An Entrepreneur's Guide to Launching and</u> <u>Managing</u> a New Business. Franklin Lakes, NJ: Career Press.

Taylor, J. (1997). <u>The 500 Year Delta: What Happens After What Comes Next.</u> New York: Harper Business. Journals, Magazines, and Newspapers

Wall Street Journal http://public.wsj.com/home.html Fortune http://www.fortune.com/fortune/ Inc. http://www.inc.com/ Entrepreneur http://www.entrepreneurmag.com/ Fast Company http://www.fastcompany.com/ Entrepreneurship Theory and Practice Journal of Business Venturing Frontiers of Entrepreneurship Research Harvard Business Review Entrepreneur Executive

Web Sites

Entrepreneur Edge Online US Small Business Administration Cyberpreneur's Guide to the Internet Entrepreneurs on the Web Entrepreneur Resource Center US Treasury Dept. NAFTANet Lexis - Nexis National Small Business Development Center National Business Incubators Association Entrepreneurship Gopher Business Sources on the Net Entrepreneur Weekly (eweekly@eweekly.com)

XI. Teaching Strategies

A wide variety of teaching methods will be used, including lecturettes, video clips, guided discussions, peer group learning, telephone/video conferencing, outside entrepreneurial speakers, online searches, and comprehensive web-based interactions. The course will be through Prometheus and will place heavy emphasis upon the use of technology in the learning environment. Learning concepts developed by Clouse and Goodin related to "just

in time" teaching and "whole-part-whole" techniques will be used throughout the course.

The course will also be made available on Prometheus, which is an online course delivery program. Heavy emphasis will be placed on the use of website and bibliographic databases to secure information for the ideas of the students.

XII. Instructors

The course will be co-taught be a professor from the School of Education and a professor from the School of Engineering. The primary professor will be from the School of Education. The education professor is both schooled in the "hard" sciences as well as the "soft." He has a background in Chemistry and Physics and work experience with the DuPont Company, IBM, and has developed two enterprises on his own. The professor from Engineering is highly skilled in the area of Biomedical Engineering. The professor from the School of Education will be assisted by a very capable advance doctoral student who has had experiences in several commercial ventures, including working for corporate America and also in the development of creative schemas for radio and video productions.

XIII. Student Interest

The combination of these three instructors represent a unique and bold step for a group to take within a structured university setting. Shortly after the course was announced to the Engineering students approximately 26 students enrolled in the class, which was originally designed for 15 students. The professors agreed to open the course to the larger student interest. Two sections of the Creativity and Entrepreneurship course are also offered and more than 50 students have enrolled. Some enrolled students are upperclassmen Engineering students.

XIV. Summary

This paper describes a process that is currently being developed, by a select group of faculty members at Vanderbilt University, to encourage cross-discipline activities. The focus of the research is to investigate ways in which the entrepreneurship spirit can be taught in a multi-disciplinary environment. We want to re-create, at the university level, the wide-eyed, curious, independent thinker that entered the first grade eighteen or nineteen years ago. We want students to understand the major differences between working for corporate America and living out his or her own dream through the development of the entrepreneurship spirit. Corporate America is "down-sizing" and "right-sizing" every day. The young college student of today will no doubt experience many up-sides and down-sides during his or her career. It is our premise that they need to know self-sufficiency and self-reliance. Through our Whole-Part-Whole teaching strategy and tying "just in time" teaching to the framework of the learner, we hope to instill this spirit in the Engineering student. Additional information about this work and

our other work in cyberspace entrepreneurship may be found at the Entrepreneurship Education Forum¹³.

XV. Acknowledgements

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