Entrepreneurs in Action: A Team Development Process

Innovation and Entrepreneurship

R. Wilburn Clouse, PHD
Vanderbilt University
wil.clouse@vanderbilt.edu
615 322 8059

Abstract

This research paper reports on learning models studied to infuse the spirit of entrepreneurship into a multi-disciplinary learning environment involving Engineering and Human and Organizational Development students. The paper describes the process used in three different models to encourage creativity, innovation and entrepreneurial thinking among diverse students. Course syllabi are available upon request.

Introduction

Almost every day when one reads the daily newspaper or views the evening news on television, one learns about corporate fraud, corporate mismanagement, spinning the mission and vision of the corporation, and as George Bush said, "cooking the books." Corporate layoffs and bankruptcy are widespread. Where is the security that we once enjoyed in corporate America? Where can a young, creative student take his or her ideas and dreams? This research is about developing a model whereby a student may take his or her idea from the classroom or laboratory to the marketplace. The research is designed to develop entrepreneurship teams of young, ambitious, innovative students and to help them mold their creative ideas into a business venture. This research is part of an ongoing research project between the Entrepreneurship Education Forum at Vanderbilt University and the School of Engineering Tennessee Technological University (TTU) to investigate ways of developing teams to think creatively and entrepreneurially. This is part of TTU's NSF grant on Innovation and Entrepreneurship. This presentation will report on the activities related to developing cross-discipline entrepreneurship teams and the process related to taking ideas for the mind to the market place. Project objective are as follows:

Project Objectives

1) The introduction of the idea of an Entrepreneurship Team
2) The development of an Entrepreneurship Team
3) The development of a series of activities for the Entrepreneurship Team
4) The development of a process to carry ideas from the team to a real world environment
5) The development of new business ventures from the creativity of the Entrepreneurship Team

6) The development of a report describing how the above objectives were accomplished.

Philosophy

We see Entrepreneurship Education as a vehicle for creating a school learning environment that fosters entrepreneurial activities and develops the mindset for thinking outside of a structured setting. Such a learning environment is designed to teach students how to live and work outside of bureaucracy, to learn to dream about new ideas and new ventures, to push the edge of the "envelope," and to see entrepreneurship as reality. By promoting creativity, innovation and entrepreneurship, we hope to nurture a new generation of entrepreneurial thinkers.

What We Believe

- The work environment will change drastically in this millennium.
- Twenty-first century entrepreneurs must think differently and more creatively.
- Much of our current schooling process teaches us how to work inside a structured and sometimes bureaucratic organization. It teaches certainty.
- Schools should teach about uncertainty, helping students learn how to deal with ambiguity and how to manage chaos.
- We need to develop citizens who will "make jobs instead of take jobs."
- People need to know how to be creative and think outside of the "box" of conformity.
- We want Americans to be prepared to compete effectively in the new global economic environment.

What is Entrepreneurship Education?

Entrepreneurship education is the process of providing individuals with concepts and skills to help them: 1) Recognize opportunities that others have overlooked, and 2) Have the insight and courage to act where others have hesitated. It includes instruction in opportunity recognition, marshaling resources in the face of risk, and initiating a business venture. It also includes instruction in business management processes such as business planning, capital development, marketing, and cash flow analysis.

We want to impact collegiate level and adult education. With the rapid advances in technology and our ever-changing world we feel that entrepreneurship education will help individuals meet the challenges that are before us. In addition, we want to conduct research on new and innovative ventures that will likely have impact on twenty-first century living and will help develop research structures for new ventures.

Courses

The following three entrepreneurship courses are currently taught:

1) HOD 2760, Creativity and Entrepreneurship -- This is an undergraduate course offered to any undergraduate student in the Vanderbilt community who is interested in creative thinking and entrepreneurial new venture development. The course is usually offered in two sections both during the fall and spring semesters. Composition of the class is primarily Human and

Organizational Development students and selected students from Engineering, Psychology and Arts and Sciences.

2) EDLS 3460, Humor, Creativity and Entrepreneurship -- This course is open to any graduate student in the Vanderbilt community who is interested in developing learning environments to promote creative and entrepreneurial thinking. The course combines the three areas of humor, creativity and entrepreneurship to develop a fun-loving but yet productive learning environment. A team entrepreneurial venture is required as part of the learning experience.

3) ES 101, Engineering Entrepreneurship Seminar -- For the past three years, with the support of the Associate Dean of the School of Engineering, we have had the privilege of teaching an entrepreneurship class at the freshman level. The concept behind the class is to bridge the gap between the development of new innovation in either classes or in the laboratory and new business ventures. This class helps the young, creative mind to connect his or her theoretical work with real work and live experiences. Engineering students also inter act with Human and Organization students.

Learning Theories

Whole-Part-Whole Teaching and Learning

A key part of this curricular design is that of a "whole-part-whole" instructional approach (Clouse, Goodin & Aniello, 2000). 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 parts (Ormrod, 1995). 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. Diagram 1 shows the conceptual framework of our whole-part-whole model. 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

Whole - Part - Whole Teaching Model

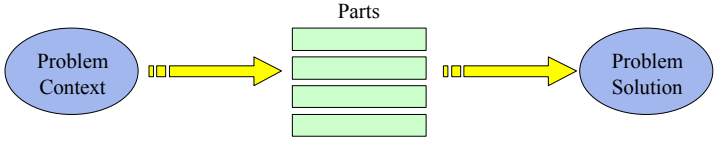

Diagram 1.

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 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.

Situated Cognition

People generally learn new information in the context in which it is used (Brown, Collins & Duguid, 1989). 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 elsewhere (Bransford, Brown & Cocking, 1999). 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 context (Lampert, 1986). 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."

Holistic Curriculum

The Cognition and Technology Group at Vanderbilt University (1990) 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.

Implementing the Course

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 productivity (Changnon, 1998).

We also use "just-in-time" teaching techniques. Once we have connected with the framework of the learner we use just-in-time techniques to teach the concepts related to entrepreneurship. After each major concept is taught, we use the recursive instructional design to reinforce the concept. The process is to connect, learn and use the concept. Diagram 2 illustrates the recursive design.

Diagram 2
Recursive Instructional Design

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 and Human Development 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 and Human Development 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. The 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 another format which is being implemented. 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.

Team Development

Most university structures are not designed to encourage cross-discipline activities. Universities are structured around academic departments that strive for excellence in their field but sometimes are myopic in their approach. Engineering students are among the brightest in universities today. They know and understand, and can apply, many of the theoretical constructs, but lack the knowledge of how to apply their learning to business ventures. Using the learning theories discussed in this paper, this research centered on developing a learning environment where cross-discipline activities can occur. In this research a cross-discipline activity took place in two of the most unnatural fields of study: Engineering and Human and Organizational Development (HOD). The two fields of study exist at Vanderbilt University in different schools and physically located across campus. To encourage cross-discipline, and to some extent cross-cultural, interface with these two groups we have tried the following models:

1) A creativity and entrepreneurship Human and Organizational Development course has been offered in the School of Education and Human Development and made available to students in the School of Engineering. The course has been approved for Engineering elective credit. Although the course has been announced and the professor has met with several engineering classes, it has still been difficult to recruit large numbers of students to cross the discipline divide. Engineering students feel more comfortable taking classes in their Engineering Building, and are reluctant to take classes with a different cohort. Engineering students who have taken the HOD class have enjoyed it, and have greatly enhanced the learning environment for other HOD students.

2) Freshman Engineering Entrepreneurship Seminar. The professor who has taught the entrepreneurship courses in the School of Education and Human Development agreed to teach a course in entrepreneurship for engineers. The concept related to this course is to capture the attention of the engineering student early in his or her career and to illustrate how new innovation can be taken to the marketplace. HOD students have been invited to participate in this seminar series. This has been an effective model, but limited in terms of student interactions. (The Education Professor also has a background in Chemistry and Physics and industrial experience.)

3) Peer Group Consultant. In this model, students who are taking the HOD class in Creativity and Entrepreneurship are required to serve as consultants to the freshman Engineering students. Students who are also taking a Marketing Leadership class are required to work with Engineering and HOD students in terms of how to market the product. We believe that this model may prove to be the most effective. Technical and non-technical students will be sharing ideas around common business ventures.

4) The Engineering students have a capstone experience in their Senior Design class. Another course is taught in Human and Organizational Development entitled, Leadership and Marketing. The HOD students in this class are required to work with the Senior Engineering Design students to identify and develop markets for the Engineering students' projects.

Strategic Approach

There is a growing body of literature concerning peer group learning and team process development. Most of the peer group learning and team development occurs within a single discipline. For example, Engineering students work together to solve technical problems and Human and Organizational Development student work together to solve and develop organizational issues and perhaps offer suggestions on social issues. These disciplines are almost always departmentalized and/or cut across other related departments such as Biomedical Engineering consulting with Electrical and Mechanical Engineering. Human and Organizational Development seldom have the opportunity to work in teams across disciplines, unless it is with fields such as Sociology and Education. Of course, some students in colleges of arts and sciences have the potential to cut across disciplines in their work. In our work between Engineering and Human and Organizational Development, we have no formal structure to tie the groups together. Therefore, we have decided to tie the groups together in terms of developing an entrepreneurial way of thinking about organizational and engineering issues.

We have structured our curriculum around the following issues:

1) Creative and Entrepreneurial Thinking
2) Marketing and Niche Development
3) Funding, Venture Capitalists, Banks, Loans, etc.
4) Legal Entities
5) Future Expansion and Growth Capabilities.

These concepts are carried out in a series of different kinds of activities. First, a formal course is taught both to the Engineering students and to the Human and Organizational Development students. Engineering students are free to take the Human and Organizational Development course, but HOD students cannot obviously take the Engineering class. Cross-discipline activities include the following: 1) HOD students teach a section on Creative Thinking to Engineering students, 2) HOD Entrepreneurship students review the marketing strategy for engineering ideas developed by Engineering students, 3) HOD and Engineering students work together to develop future markets for engineering ideas. Copies of the Engineering and HOD syllabi are available upon request.

The academic program is also enhanced with a series of local Entrepreneurship Forums. At the present time, we have had 21 local entrepreneurs and/or venture capitalists to present sessions on campus where both groups and others are invited to attend. We have also had 4 Regional Forums, composed of venture capitalists, entrepreneurs, CEOs, university administrators and university faculty to discuss entrepreneurship issues at the regional level. Students are invited to attend these Regional Forums.

The Vanderbilt University is moving toward a residential college concept. We are actively encouraging the university to develop one residential college related to entrepreneurship, where students of a wide range of backgrounds would have the opportunity to live in close proximity and discuss the entrepreneurship spirit as it permeates Engineering, Science, Law, Geography, History, English, Languages, Organizations and social and policy issues. If we are successful in this venture, we believe that this type of interaction will greatly enhance the cross-discipline, multi-cultural learning environment.

At the end of the academic year, we have an award ceremony where the best of the best receive an award for their business plan idea. Awards are given both to Engineering students and to Human and Organizational Development students. This serves as an opportunity to bring the students together in an informal environment and also to involve local university administrative officers.

Summary

Developing cross-disciplinary courses in a highly-structured university setting is sometimes very difficult. Early in the career of a student he or she becomes focused on a particular field of study and frequently cannot see a commercial application of their work. This is why we believe the whole-part-whole learning concept is very valid in a cross-discipline learning environment. Furthermore, we strongly support just-in-time teaching and also the use of the recursive design in an inter-disciplinary approach.

We believe that students who can see new and different opportunities in the future will be the most successful. They will be the students who can lead the United States in development and changing the world economy.

Additional information about our work can also be viewed at our web site http://enterpreneurship.vanderbilt.edu or from the Vanderbilt University web site under Centers and Institutes.

This research was supported in part by grants from the Coleman Foundation and the National Science Foundation/Tennessee Technological University. This Program is a part of The Entrepreneurship Education Forum at Vanderbilt University.

REFERENCES

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (1999). How people learn: Brain, mind, experience, and school. Washington, DC: National Academy Press.

Brown, J. S., Collins, A. & Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18 (1), 32-41.

Changnon, D. (1998). Design and test of a "hands-on" applied climate course in an undergraduate meteorology program. Bulletin of the American Meteorological Society, 79 (1), 79-84.

Clouse, R. W., Goodin, T. L., Aniello, J. (2000). Entrepreneurship education for the third millennium: Taking over the world with the "E" spirit. In A. Nadim (Ed.), United States Association for Small Business and Entrepreneurship. The Entrepreneurial Millennium (p. 248). San Antonio, TX: United States Association for Small Business and Entrepreneurship.

Cognition and Technology Group at Vanderbilt (1990). Anchored instruction and its relationship to situated cognition. Educational Researcher, 19 (6), 2-10.

Lampert, M. (1986). Knowing, doing, and teaching multiplication. Cognition and Instruction (3), 305–342.

Ormrod, J. (1995). Educational psychology: Principles and applications. Englewood Cliffs, NJ: Simon and Schuster.