

Learning: It's Not Just For Breakfast Anymore Changes in the Civil Engineering Program at NMSU

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Abstract

The civil engineering technology (CET) program at NMSU is working hard to create an atmosphere in which students want to learn. With help from the NMSU Space Grant Consortium and other resources, the CET faculty are able to provide materials to support their goals for the program. The faculty believe that the most effective way to motivate and retain students is to involve them in many facets of our discipline during their academic career. We want to give each student the experience of having been served and appreciated. Our goal is to provide students not only relevant class room topics, but to support them outside of class through fieldtrips, student organization involvement, library/study room for CET use only, industry mentors, school projects, outside projects, competitions, design seminars, conferences, etc. This paper outlines the changes that the CET program has implemented, and reports evidence of increased interest, work, enrollment, and retention.

Introduction

Learning is the reason we are all here. Whether we are dedicated more to research or the teaching process, the basic reason we work in the university environment is because we have a passion for learning. We struggle with it everyday. We wonder why on a certain day or on a certain topic the flow of information seems to be out into space because it certainly is not going into the student's head. Thousands of philosophies have been put forth over the years to try and maximize the transfer of information. We have all tried many of them as well as some of our own that seem to work in a particular situation.

The Department of Engineering Technology (ET) at New Mexico State University (NMSU), as with most ET departments around the country, deals with this general question of learning through the idea of applicability. The overall emphasis of most of the courses is on the practical, hands-on side of things. This, of course, is right out of the undergraduate catalog and how this works in a specific class can vary all over the place.

Because of this hands-on approach, the ET Department here at NMSU attracts a somewhat different cross-section of students than other departments in the College of Engineering (COE). A greater percentage of the students fall into the category of "non-traditional." Of the 12 senior students presently in the Civil Engineering Technology (CET) Program, 10 have families to support. As such, it follows that many have outside jobs; nine work 30 or more hours per week. Compare this to the 16 seniors presently in the Civil and Geological Engineering Department. Of the 16, only two fall into the category of non-traditional.

The authors are the two full time faculty in the Civil Program within ET. The program presently has 71 students. With only two faculty, there is lots of student contact time, both in and outside of the classroom. Within one or two semesters of a student entering the program, both faculty members usually

know not only their name but their hometown, the members of their family, their significant other, their living situation, what kind of car (or lack thereof) they drive and their financial problems. The division between academic advising and personal counseling can often become quite transparent.

Is this “atmosphere” a good thing? If the business of the university is learning, how does the departmental atmosphere affect our “clients”? Are we constantly fed the idea that the only place to improve learning is in our classrooms or laboratories? Are there problems with learning that can be dealt with “out-of-the-classroom”? This paper will address some of these problems as well as the philosophy of learning within the Civil Engineering Technology (CET) Program and its connection with those often sought-after metrics of learning: enrollment and retention.

Problems

What are those problems that can be considered “out-of-the-classroom”? Certainly one of the most common is a lost of interest. The rigors of going to school, combined with job and family, can wipe out a student's interest in academia very quickly. The authors have spent dozens of hours with students wading through the mud of family problems, finances and lack of time for study. At the end of the day many find that studies have to take last place in their lives. This leads, of course, to a drop in the quality of the student's work. There are few things more disappointing for a teacher than seeing a high achieving student who is capable of “A” work reverting to someone who rarely hands-in assignments. And when they do turn-in their work it is obvious that the labor was done half-heartedly.

What is most unfortunate about these situations is that it is only a matter of time before the student either drastically cuts back on their time at the university or they end up dropping out altogether. The new President at New Mexico State University, as well as the Dean of the College of Engineering, have made retention one of their priorities. In ET, the issue of retention can only be addressed if one considers the issues facing these non-traditional students and what motivates them.

For there to be a chance balancing studies with family and work pressures, students need to feel that they have a place in the “system.” Most non-traditional students are not interested in the mythological university experience, but they nevertheless need to feel they belong here. As with any kind of group dynamic, if the members feel that they have some kind of “stake” or ownership in the process then motivation usually follows. The process in this case is learning.

Strategies

One of the approaches that the CET program has taken is to treat the learning process as a business. If the learning process - and its agent, the university - is a business, then the students are the clients. How does one satisfy the needs of the client when the variety of those needs is so huge? These are not clients that one sees once a week for a scheduled meeting. We interact with them on a daily basis. As crazy as it may sound, the CET program has adopted a business outlook similar to the of the Pike's Place Fish Market, one of the most successful commercial enterprises (in terms of growth and customer satisfaction) in the Seattle area. What follows is taken from the Home Page at www.pikeplacefish.com :

A few years ago, we at Pike Place Fish committed ourselves to becoming "world famous". We've accomplished this - not by spending any money on advertising (we've never spent a dime), but by being truly great with people. We interact with people with a strong desire to make a difference for them. We want to give each person the experience of having been served and appreciated, whether they buy fish or not. We believe that it's possible for a person to impact the way other people experience life. Through our work,

we can improve the quality of life for others. We are committed to this belief. It's what we do.

Is it conceivable that this outlook has a place in academia? Is it so ridiculous to substitute the name of NMSU in for "Pike Place" and the name of one's particular department for the word "fish"? Can learning be affected if the overriding attitude is one of: "giving each person the experience of having been served and appreciated"? We are not in the business of providing entertainment while we package a product, like the fish market, but there are many ways in which students can be made to feel their departments do care about them – and not just for the resulting Student Credit Hours. Over the past several years, efforts have been made in CET to bring this philosophy to the students. These efforts have been greatly accelerated by a grant from the New Mexico Space Grant Consortium through their Education Enhancement Program. What follows are descriptions of some of the activities involved with "fishifying" the CET Program.

One way of looking at the fish market philosophy is that it helps the client to feel like they are part of a community instead of simply a customer. In terms of university students, one way this can be accomplished through student organizations. The authors have seen many a nervous freshman or older student find a place where they can express themselves through the many varied organizations available to the ET student. The principal groups that are of interest to the CET program are the Associated General Contractors (AGC), the American Society of Civil Engineers (ASCE), and the Society of Women Engineers (SWE). These organizations often have competitions between the various universities that have chapters. These competitions help to solidify the concept of community through the necessity of teamwork, compromise and that seldom used word in engineering: fun. Funding from the Education Enhancement Program paid for construction reference material to be used by the AGC Bid Competition Team at the organization's regional conference in Reno, Nevada. Professional seminars held at this and other locations deal with methods, products and codes of the Construction/Civil Engineering World. It is fascinating to watch student's reactions as they hear the words and formulas from their classes being used by professionals with 20 years experience in the work place. Famous quotation: "Oh geez, I guess they really do use this stuff."

One item that just about every community has is a newspaper. The CET program is no different. Once or twice a semester a newsletter is printed that highlights the student activities as well as other highlights from the program. Lots of pictures are included. News and thanks to outside organizations that take part in the activities of the CET, such as the NM Space Grant Consortium, are included.

In order to emphasize the applicability component of the CET Program, many of the classes and laboratories include a project component. In the classes benefiting from the Education Enhancement Program (EEP), Applied Structures I and II, students first learn about structural design and then are required to build either a scale or full-size structure based on their design. These structures are then tested under the proposed loading conditions to determine if what was predicted is accurate in reality. The project approach allows the student to get into the details of not only the design phase but also of the construction phase. This includes all the people aspects of a project. One student blurted out during the fabrication of one of the projects, "Well, I don't know if all the numbers will stick in my head but trying to work and get along with these jerks is something I'll never forget." Besides the practice of the project itself, students have the opportunity to create something that will be around the program for a long time after they themselves are gone. Past projects have included scale model bridges and other scaled structures. These can be great recruiting tools as well as displays for the department. Just completed projects include a full-size pedestrian bridge to be installed east of EC III; as well as a scale model of a collapsible truss as has been used on the space shuttle for towing satellites and solar arrays. The design load for the scaled truss is one of the students hanging from the end of it. Nothing peaks a student's interest in making sure the design is done right as knowing that they are the design load. One application

of the “space” truss is as a future project in the KC-135 Reduced Gravity Program, a program that is sponsored by the Space Grant Consortium. Funding from the EEP paid for design manuals and computer software for the design part of the class as well as materials used in construction.

Every community needs to have a place to congregate. Last year when an office was vacated in Engineering Complex III, students and faculty from CET turned the space into a study/meeting area and reference library. From day one the facility has become almost over-utilized. By no means is the idea of the space to replace facilities like the main library on campus. That would be impossible. It does, however, give the students a place that they can call their own as well as easy access to multiple manuals and workbooks used their classes. As of the writing of this report, 11 different sets of manuals, codes and design guides, have been purchased with EEP funds.

Results

Have any of these activities brought change/improvement in any measurable ways? Enrollment numbers are easy to tabulate. From 1998 to 1999 the CET program grew by 22%. From 1999 to 2000 the growth was 23%. From the fall of 2000 through the same period in 2001, the rate slowed to 2%. It should be noted that this was during a period when most other departments in the COE experienced a loss in students. Looking at retention, 68% of the freshman starting the program in 1997 had graduated by 2001. Based on the enrollment of seniors currently in the program, this number is expected to increase to 70% in 2002. Involvement in student organizations has climbed. Membership in AGC doubled in the last two years. Last year, members of the organization observed the activities at the regional conference, this year they will be taking part with seven to nine members making the trip. Membership in ASCE, an organization traditionally just for Civil Engineering Majors, now has 10 active CET students, including one of the officers. As of the end of 2000, the KC-135 Reduced Gravity Program had never seen a team from NMSU. In 2001, NMSU sent its first representatives to Houston to test their all-terrain landing module aboard the “Vomit-Comet.” One team member as well one of the team’s advisors were from the CET Program. Two more proposals were submitted for the 2002 flights.

If comments from students can be considered as indicators of attitudes and motivations in the CET department, then perhaps there is one that should be included here. This comment, overheard while walking by the CET study area/reference library, came in-between large bites of a Big Mac from an older student with three kids. “Ya know (munch, munch), when I first started this college thing I felt like I was on some other planet. I didn’t belong here with all these 20-year olds (munch, munch). But sitting here right now, I feel like I’m part of this place...like I’m finally on the inside.”

Maybe it was the burger, maybe it was the fish...or perhaps learning is not just for breakfast anymore.