

the non-verbal subtleties of instructor communication.

If nothing else, however, the survey findings emphasize the need for improved evaluation methods and instruments. Further, the results seem to show a need to avoid setting artificial standards against which all instructors are to be measured.

If teaching is an art rather than a science, and many believe such is the case, then only by a gut feeling can one subjectively (non-scientifically) compare the teaching ability of one instructor to that of another just as that same feeling compares the work of a Grandma Moses to that of a Michelangelo.

It's true that competent art critics approach objective (scientific) criticism by developing criteria from art works which have stood the test of time. Such things as conformation, texture, expression, center of interest, balance and perspective seem to add credence to their decision that one painting may be better than others.

In the evaluation of the art of teaching, too, acceptable criteria may be found. But, such qualitative matrices are elusive, at best. We need to avoid the ready devices which appear to

answer the evaluation problem — devices which falsely force round or qualitative pegs into square or quantitative holes. What we need is a board with round holes for teaching's round pegs.

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## TECHNIQUES TOWARD ACHIEVING STUDENT SELF-MOTIVATION<sup>1</sup>

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Instructors are constantly seeking teaching methods that will motivate students. However, if techniques exist that can accomplish student self-motivation, I submit that the instructor's job would become considerably simplified as he manages the learning process and watches the students teach themselves.

### The Importance of Administrative Support for Teaching Excellence

A slight digression is necessary prior to examining techniques to accomplish student self-motivation. Teaching excellence, or concerted efforts to achieve excellence, only occur when administrators believe teaching is important. Starting at the departmental level and continuing through the upper echelons of the University, administrators must establish an atmosphere that convinces students and instructors alike that teaching is a serious business and a privilege.

Students seem to be intuitively capable of detecting attitudes, and if teaching is viewed as a serious business, then learning also becomes serious business. While said in jest, the oft heard comment "... this would be a fine University if it wasn't for the students" reflects an attitude that prevents excellence in the classroom.

I submit that the prevailing attitude of an institution regarding teaching can be ascertained through the answers to three questions:

- 1) Do present instructors regard teaching as a duty or a privilege?
- 2) Who teaches the freshman-sophomore level courses?
- 3) When administrators meet to divide the salary pie, does teaching rank equally with research and extension?

If an institution has a policy that permits, encourages or requires instructors below the rank of Assistant Instructor to meet classes; if classes are assigned to teachers rather than being competed for; if teaching is fine but research is the path to glory; if any of these attitudes or policies exist within an institution, then I must conclude that the commitment to teaching is tenuous at best.

### Assuming an Administrative Commitment to Quality Instruction

Providing there exists administrative support for teaching excellence, the instructors who are permitted to teach soon find themselves in a competitive environment that forces the teacher

to strive for personal excellence. However, a college commitment to quality instruction generates problems that require solutions if real learning is to take place. Classes increase in size. A college commitment to teaching means that budget increases for additional teaching staff are justified by present overloads. First, generate the overload, and then obtain the additional teachers. Given a competitive teaching environment, the additional staff create additional overloads rather than provide relief to problems that accompany large classes.

### The Large Class Syndrome

I am convinced that dedication to teaching means large classes. The problem is how can the instructor motivate the individual student in a sea of faces and still retain his sanity at the end of the semester. Years ago, the sane instructors counseled me that the only way to exist in such an environment was for the instructor to become as lazy as possible by providing gimmicks that permit the students to teach themselves much of the course material.

Now, terms like "lazy" and "gimmicks" are for internal use only and are not recommended syntax for administrators or legislators. Can a teacher be lazy, use gimmicks and still teach effectively? I have become convinced that effective teaching requires a lazy instructor and will now hasten to justify this apparent heresy.

### Observations on the Use of TV and Audio-Tutorial Laboratories

Over the years, I have attended dozens of teaching improvement workshops, meetings, conferences and discussion groups. The use of TV lectures for servicing large classes was a panacea offered at an early workshop. However, the amount of effort required to think through a semester's work, organize it in some rational manner, anticipate the questions that would come from a live class, provide answers on tape, keep the lectures lively and the time expended in filming, editing and re-filming and re-editing — is horrendous.

A few, non-lazy instructors took the year of week-ends and vacation time required to place a course on the "tube." And the result? After an initial student enthusiasm that always accompanies a new technique, the ingrates complained vigorously to the administrators concerning the lack of learning taking place and the impersonal nature of the process.

Another workshop, held a few years ago in Illinois, demonstrated the latest technology in audio-tutorial instruction. Slide

<sup>1</sup> From remarks originally presented for the Educational Workshop, American Agricultural Economics Association Annual Meeting, Gainesville, Florida, August 24, 1972.

sets, eight MM film loops, tape cassettes, the construction of physical facilities with banks of learning carrels were fully explained and praised. The participants were cajoled to place their courses into this new teaching environment. Again, the hard workers rose to the challenge – a challenge greater in my estimation than the effort required to video tape lectures. The hard working instructors became producers, directors, carpenters, photographers, audio experts; the students were again bored after too short a time considering the effort expended.

### **Independent Study as a Means to Achieve Personal Contact with Students**

Independent study is still advanced as one method of recapturing the teacher-student relationship that must have existed between Socrates and Plato. Given the large class syndrome that accompanies devotion to teaching, the hard workers who place their courses on an individualized independent study basis soon develop glazed eyes and noticeably strained family relationships as they are forced to have one student conference after another. They read and re-read, edit, comment upon and grade a stack of unrelated student research papers that threaten to eclipse their bookcases. The student soon finds the instructor increasingly unavailable or unapproachable and becomes somewhat disenchanted with his self-learning efforts.

### **The Computer as a Panacea**

This June I had a small hand in the development of, and participated in, yet another teaching workshop sponsored by the northcentral directors of resident instruction. This time the technique was CAI, and the advocates of computer assisted instruction informed us that the computer could take over the details of instruction leaving the professor free to concentrate his efforts upon the management of instruction. I confess some understanding of computers and in my judgement the man-years required to construct the programmed learning trees, the pre- and post-test branch back networks for any course that has real substance, makes TV and audio-tutorial preparations seem like child's play.

Not that CAI is impossible. For I have seen CAI courses that are used to instruct medical doctors on the complex techniques of diagnostics. Calculus can and is being taught completely through CAI instructional terminals. A few colleges have or are moving toward switching all their course work over to computers. The CAI experts suggest that it requires over a man year to place a course into the computer, and the hard workers have again risen to the bait that requires the commitment of nights, weekends and vacation time since year long sabbaticals are not common at our institution.

The students are enthralled with CAI. They can progress at their own pace, take "courses" when they want – on Sunday, if they wish and take off for a few days skiing trip. But these were the same advantages listed for audio-tutorial instruction. I now hear rumblings that after millions of dollars have been expended for full CAI facilities, the ungrateful students are once again becoming bored. The students I employ to run computer programs say they can only work at top efficiency on a cathode ray terminal for about half an hour. After that time they become hypnotized by the light cursor as it weaves its magic over the screen.

### **Advantages of a "Mixed Approach"**

In the critiques that always follow teaching workshops, I have hypothesized that if the growth in new concepts of instruction continues at present rates, then a relevant topic for some future group might be to explore that newest of teaching methods – the lecture.

Independent study, audio-tutorial instruction, courses via TV, CAI and even the lecture, each of these alone requires great effort by the serious teacher and often result in bored students and thus non-optimal learning situations. However, I have observed that a judicious mixing of all these instructional

methods has great advantages for the instructor and for the students.

### **An Honor's Program Can Reduce the Requests for Independent Study**

For that group of students that are gifted with high IQ's, possess great self-motivation and become bored with the lock step progress of standard curriculums – establish an honors program that permits them to take any course they wish without prerequisites. Each student develops a program and defends it before a small supervisory committee. At Nebraska, College of Agriculture honor students have 124 elective hours and only two required seminars. Our experience has been that the main job of the supervisory committees is to suggest easier courses in the student's program. Our honor students do not earn straight A's; B to B+ would be typical since they are taking course work without the normal background material. They enter courses that are a little over their heads, study hard to make up their deficiencies and find little time to become bored, and the instructor's job is simplified by a reduction in requests for individualized independent study.

The lazy instructor can now spend time with the relatively few students who request credit for pursuing in depth a topic of special interest. Even lazier is the instructor who meets with students working under him in independent study as a group and has the group debate and approve the topics and methodology. Here the instructor manages the learning situation and the students do the work, even going as far as primarily evaluating each others efforts.

### **Use of Student Teams**

I have found many concepts difficult to present adequately in a lecture format. We use computerized gaming simulators – many modified from the original programming work conducted at Purdue. In one simulator, the concepts of oligopoly introduced in lectures are reinforced by dividing the class into teams. Five students comprise the Board of Directors of each team in the simulation. The Board must make weekly decisions on pricing strategies and many other variables. When I lecture about management strategies under various organizational and conduct structures the students pay attention since they can use the knowledge in their "firm." Lecture topics flow from the results of a particularly good or poor decision.

At least three of our department courses are built around simulators, and during the semester you find "Board Meetings" taking place day and night in department conference rooms, dorms, coffee shops and in student lounges. There are five board members, but only one decision permitted per team. Each student tries to convince the other four of the virtues of his analytical process – and learning takes place. The lazy instructor gets credit for a job well done.

We use the concept of student teams in many ways. Classroom instruction concerning the intricacies of futures market applications to farming and agri-business situations is supplemented by having student teams compete in a semester-long hedging and speculation problem. The efforts of the teams and the current real world situation provide many opportunities for lectures, saving the lazy instructor the time that was formally devoted to asking himself, "What am I going to talk about in tomorrow's lecture?"

Our department statistical courses also employ student teams to solve complex problems on the computer. Here the emphasis is on the methodology and the interpretation of results which the students present to the class unburdened by the busy-work associated with hand calculations.

In one production economics course the students are divided into linear programming teams and are required each week to solve problems that illustrate a particular theoretical issue. Since different problems are assigned to each team, the lazy instructor asks wise questions of the student presentations and is praised for the relevancy of his material.

The same approach is used in our computer feed formulation

course with an even lazier modification. Rather than have a single instructor take the effort to become knowledgeable in the economic, biochemical and nutritional intricacies of beef, swine, poultry and dairy ration formulation, we use five instructors, each an expert in his field. The students solve complex ration formulations after four hours of computer instruction. Self-instruction takes place as the teams prepare their results for presentation to the full class. The students are exposed to five professorial lecture techniques, and the computer takes care of the details of matrix inversion.

### **Output from Student Teams can Support Research and Extension Activities**

In policy classes, the students form research groups that explore in some depth topics that interest both them and the instructor. Many of the student research efforts are either published in department reports or are presented to other staff, political or business leaders through seminars. Some of the student efforts in policy have resulted in extension publications; others have been known to serve as the basis of research grants for staff members, and some have even appeared in speeches by state and national politicians.

### **The Lecture Phone Permits Many "Teachers" to Meet the Students**

Many a bad lecture has been prevented by a lazy instructor who was able to convince a fellow staff member, a political figure, community leader or anyone with specialized knowledge to spend a few minutes with his class. The secret is not to let the visiting firemen lecture, but to start off with questions. This permits the lazy instructor to control the presentation and the students praise the effort as innovative.

Even lazier is the instructor who employs a telephone lecture unit to expand his guest speaker list. Equipped with multiple microphones and loud speakers, the instructor can call upon experts anywhere in the country for a quick five minute or more question and answer session with his class. While budget, time or scheduling limitations generally restrict the number of experts that can meet with a class, the instructor with a tele-lecture unit finds that few individuals object or can resist the chance to visit with a class over the phone.

### **Audio-Tutorial Equipment Used to Supplement Lectures**

Mixed techniques are the key. The department has an audio-tutorial laboratory. It is not a pretentious installation; two learning carrels only. We use it to supplement lectures, not replace them. For example, concepts of price discrimination are among the theoretical points I devote some time to in my marketing lectures. To some students this is heady stuff as they debate with me the present and future applications to agricultural marketing situations. However, the details of the mathematical treatment can often overshadow the basic principle. I spent about a day putting down on paper a few examples, photographed my efforts with the department camera and talked into a cassette tape recorder. Two primitive half-hour mini courses in price discrimination were the result for a cost of about five dollars. While not complete courses, the audio-tutorial tapes permit the students to listen to the instructor in the lecture hall and listen again to a slightly different treatment of the subject in the laboratory, as often as they wish. For the lazy instructor, this saves untold time outside of class that was formerly devoted to student requests to "explain that thing one more time."

We now have about twenty-five mini concepts in the laboratory, covering subject matter from elasticity to the techniques of derivation. Students are pleased because the instructor is always "in" to explain a particular point.

### **The Computer Terminal Used for Simulation and Problem Solving**

At Nebraska we are fortunate to have a computing network with many remote terminals – over 100 at last count, mostly cathode ray tubes. While full CAI requires man years of input, small interactive drill and practice routines and mini simulators

can be easily constructed. A number of the teaching staff are writing these little demonstrations to pound into the student concepts that require repetition to achieve full understanding. The concept of demand elasticity and the resulting effects upon gross income is one of the mini-concepts available to students. They can submit situation after situation to the interactive program, see the results immediately and not become bogged down in the mechanics of mathematical calculations.

Some interactive computer languages are relatively easy to learn and our students solve many of their production economic and statistical homework problems by writing small routines through the computer terminals. The instructors are aware of this practice, and counter this gambit by assigning problems that would require days of hand calculation. The result? Students learn more since the complex problems more closely approximate reality and boredom is reduced with the realization by both instructors and students that rote mathematical operations have no place in course work which purports to teach agricultural sciences.

### **Students can be "Taught" Computers through TV**

A fellow staff member at the college is nearly as lazy as I am. He has also developed a number of mini-models for computer supplementary instruction. However, he and I have both found that students need some instruction in remote terminal operations if we want them to take full advantage of self-teaching situations. To keep the questions in our office to a minimum, we spent about a week with a video recorder working on the terminals. Six half-hour TV lectures resulted. We didn't have a script, nor were we bothered with directors and producers. With the camera on the remote I would ask the typical dumb questions that we have been asked so many times and he would show me how to solve my problem.

These amateurish efforts will be used by the computer network to instruct new employees and students. The tapes can be piped into classrooms over closed-circuit TV and are also available for individual student use at the media centers on campus.

### **Conclusion**

Variety in instructional methods promotes student interest and permits learning to take place. Variety means that the instructor does not have to spend the time in preparation required for a full TV, CAI, audio-tutorial independent study or lecture presentation of his material.

I've stressed laziness and gimmicks – for those who require more academic-sounding terminology. I substitute flexibility for laziness and for gimmicks I suggest multiple teaching techniques.

My complete theme can then be restated as follows: **Effective teaching requires a flexible instructor who employs multiple teaching techniques which then create an environment where learning takes place both in and outside the classroom through multiple teacher-student interfaces and frequent student-to-student interaction.**

## **DIRECTORY OF ENVIRONMENTAL CONSULTANTS TO BE PUBLISHED**

Environmentally concerned professionals interested in the applied problems of environmental planning can be listed in the Second Annual Edition of The Directory of Environmental Consultants. The multi-disciplinary Directory will be published in several languages and will be open to listings from every country.

The Directory's purpose is to provide a basis for scientific consensus in environmental planning. It also serves as an information source for researchers interested in similar problems, and its existence can influence the quality of preliminary planning by Governments and Industries.

Professionals interested in additional information and directions for resume preparation for the Directory should send a self-addressed, stamped envelope to: Directory of Environmental Consultants, P. O. Box 8002, St. Louis, Missouri 63108, USA. Inquiries from outside North America need not provide postage on their envelope.