



INNOVATION ABSTRACTS

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Using Combined Auditory, Kinesthetic, and Visual Learning Methods in the Auto Shop

"Crayons! Crayons? Son, why are you taking crayons to college?"

"I'm using them in my auto mechanics class, Dad. The teacher has us color the hydraulic diagrams for our automatic transmissions."

I teach auto mechanics to community college students. Their ages range from 18 to 65 years. They exhibit a wide variety of learning methods. Some are kinesthetic learners who learn best by touching. Others are auditory learners who learn best via listening. (All of us use all three methods, but we normally use one method more than the others.) Most of my students are visual and/or kinesthetic learners. Very few are auditory learners. Yet auditory learning skills are expected for the lecture portion of class. I have found a way to combine all three major learning methods into one. I still use an auditory lecture, but I supplement it with visual and kinesthetic methods at the same time.

Automatic transmissions have hydraulic circuits that are used to control when the transmission shifts gears. In each gear different passageways are filled with oil. When students first see the complete factory hydraulic schematic of a production transmission, they are overwhelmed. They can't see the individual components because of the overall complexity. Therefore, I created a beginning generic hydraulic schematic of the transmission gears. There are eight or more different patterns for them to learn. It would be very time-consuming to make a unique drawing for each gear of each transmission, so I use a computer to make a basic pattern. At first I thought that I would have to master computer graphics to create this pattern. But after experimentation I found that a simple word processing program, rather than complex graphics, was all I needed. The time-consuming part is creating the original generic form. The easy part is to copy the basic form using the computer and then to modify just those parts that are different in each gear. As I teach each new transmission, all I do is modify the generic form and include the different features of the current transmission, rather than create a new computer form.

I also create a schematic diagram that identifies the physical location of the various clutches and bands controlled by the hydraulic system. As well, these diagrams are computer files for easy manipulation. For both types of schematics I use the same color codes for the bands and clutches. That way the student can see that the red-colored pressure in the hydraulic schematic is responsible for applying the red-colored clutch in the physical location schematic.

In lecture class I use these two forms as the organizing format for my lecture on transmissions. I have the students sit around the table at the front of the room while I lecture. As I lecture, I have them color the various hydraulic circuits that I am explaining. I use one color for mainline pressure and others for throttle pressure and governor pressure. The students are all close at hand, so I can easily use the form that I am also coloring to show them how the circuits function. Since I use a different form for each gear, the student can see what is happening—as the transmission shifts gears—by flipping rapidly from chart to chart. The forms can also be used to make overhead projector transparencies (via the copying machine).

I have found that student comprehension of basic automatic transmission hydraulic theory has increased since I have begun using this combined auditory, visual, and kinesthetic method of teaching. I know this because I also use the charts on my tests. One part of the test is to color a duplicate of one of the pages that we colored in class. Then students can use their diagram to help answer the short essay question about the operation of the hydraulic system as it shifts from gear to gear. Students at first joke about bringing crayons to college, but soon they are proud of their sketches!

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Using the Computer to Recruit Auto Students

At Kankakee Community College the instructor is the person primarily responsible for recruitment, and career center schools are the main source of new students. I have tried several methods of getting students' attention when I visit with them in recruiting sessions that can last as long as two hours. I knew that I needed to impress students with Kankakee Community College and to talk about the advantages of attending my college. This year I tried what has proven to be a very successful approach. What I discovered is that if you *give them something to do* while you are talking, they will more likely give you their attention.

First, I have students complete a form on which they list their name, address, and presumed college major; then they check boxes to request additional information that they might want about my college. This form is not ordinary! Between the major sections of the form are statements about my college—such as, "Did you know that the Auto Mechanics certificate program takes only eight months to complete?" I intend that students, in completing the form, get the first of several presentations about what I want them to know about my auto program. The entire process is a "soft sell." After they fill out the survey form, I give them a sheet that says, "Help Wanted: Auto Mechanic. Must be able to fix PFI, TBI, and DIS." Following the "ad," I list some of the advantages of my program—such as, the cost. Many times the students will ask what PFI, TBI, and DIS mean. This lack of definition on the ad sheet is deliberate because it sparks questions and discussion about the program. I tell them that DIS stands for distributorless ignition system, which is a computer-controlled system with no moving parts, other than two magnets, that has taken the place of the old mechanical distributor. TBI is throttle body fuel injection, and PFI is port fuel injection. Once those questions are answered, I tell them that autos are computers with tires on them and that I will teach them a basic computer skill that they will be able to use when they own their own businesses (most incoming college freshmen dream of owning their own businesses someday).

Then I ask if anyone has prior computer experience. (The high school students to whom I speak fall into two categories: the minority is computer literate; the majority has never touched a computer. The novelty of learning a little about computers makes this activity particularly exciting.) Those who do have prior

experience are designated as the typists. The students are divided into equal-sized groups, using as many personal computers as the high school can spare. Each team is given a printed sheet with the words and formulas that are to be entered into each cell of the spreadsheet—developed for my Computerized Shop Management class. It is the first that the students study. It will calculate take-home pay (by entering the amount paid per hour), the number of hours worked, and the federal and state tax rates expressed as percentages. I talk them through the entire spreadsheet, one step at a time. Then they get to play "what if" with the form. I have them give themselves a raise. I have them increase the tax rates. They can instantly see what would happen to their checks if these changes were made. (Many express surprise that so much money is being withheld as taxes!)

Depending upon the time available, I have them use another spreadsheet to calculate a customer's bill. It will perform a financial analysis of the profitability of that bill—calculating the cost of rent, insurance, utilities, etc.

When I have more time, I use a program that simulates an engine that continually breaks down. The object of this program is to drive the car, then diagnose and fix the failures while the program keeps track of the amount of money spent. (I use this program in my shop; and many students discover, in using that program, that they need more study. A variation within this program is a series of five cars that have increasing numbers of problems. The object is to fix all of the problems with the least expenditure of time and money.)

The students have fun with these exercises. The computer is the "hook" to get their interest, and then I can promote my program.

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