

Building a Better Technician:
The Dynamic Merging of Academics, Career Tech, and Industry

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The Caterpillar Dealer Service Technician Program (ThinkBIG) at San Joaquin Delta College in Stockton, California consists of a series of career and technical education courses, focusing on specialized areas in the field of heavy equipment maintenance and repair, as well as general education courses that fulfill the AS requirement. The curriculum in the career tech courses (e.g., fuel systems, electrical systems, hydraulic systems) directly relates to industry, and the instructors constantly reference real world situations. By the time the students in this apprenticeship program complete the series of Caterpillar (CAT) courses, they are more than sufficiently prepared to diagnose and service CAT engines and heavy equipment machinery.

During my first semester as English instructor for the ThinkBIG program, I had the opportunity to observe several career tech CAT classes. What I saw filled me with admiration and envy. These courses were so specialized—the curriculum so *relevant* to the students' future occupations—that the students were attentive to their instructors, engaged with the material, and overall eager to learn. At that time, I began thinking of ways to make my own curriculum in the ThinkBIG program more meaningful, especially since the majority of the students were struggling with reading, grammar, and composition at the basic skills level and many brought with them into the classroom negative attitudes about their previous educational experiences. How could I transform my standard English course into more of an *applied* English course? How could I, as a general education instructor, contribute to the ThinkBIG program and help build a better technician?

The answer seemed simple: my course needed to blend academics with at least one of the career tech courses as well as industry. Yet merging these disparate worlds would not be so easy.

I had no idea what English skills apprentices utilized in their CAT courses, nor what English skills technicians needed on the job. Knowledge of the career tech content and the students' future occupations seemed essential for the enrichment of my own curriculum.

Thus, over a ten-month period, I formed a learning community with one of the career tech CAT courses, I interviewed various personnel at California's five Caterpillar dealerships (Hawthorne Machinery, Holt of California, Johnson Machinery, Peterson Holding Company, and Quinn Company), and I observed the students in a simulation of the workplace—one of their CAT labs. In this paper, I will discuss each of these curriculum-enhancing strategies and their outcomes.

Forging a Learning Community

In fall 2007, a year after teaching my first ThinkBIG class, I developed a learning community (LC) with one of the career tech CAT courses taught by Dan Carter, a former Peterson Tractor Technician. CAT 90 (Undercarriage and Final Drives) and English 79 (Preparatory English) shared student learning outcomes, related assignments, and frequent instructor communication.

The students' first writing assignment was a ThinkBIG biography, asking them to explain their reasons for applying to the program, why they believe they were selected, and how the program would help them attain their career goals. Using material from the CAT 90 textbook, I also created multiple grammar assignments and taught the assignments directly following the CAT 90 lectures to emphasize the subject matter. The final exam for Preparatory English was an argumentative essay, requiring students to take a position on brake preference (hydraulic or air) in the heavy equipment industry—a topic they had recently covered in CAT 90. Carter did his

part by grading spelling, word usage, and other sentence level errors on the students' homework, service reports, and exams. We both emphasized attention to detail, critical thinking skills, and the importance of presentation both in and out of the classroom.



ThinkBig Class of 2008 with Career Tech Instructors Rich Detloff and Larry Paulsen.

Overall, the students found the learning community stimulating. Writing about their occupations engaged them, and sharing course material with CAT 90 made Preparatory English more relevant. Also, having both courses emphasize the same key concepts, such as attention to detail and critical thinking, strengthened the community. Through numerous discussions, Carter and I discovered that many of our student-learning outcomes were not so different. “Without clear communication skills,” explained Carter, “a technician cannot make accurate repairs.” This inspired me to create more collaborative grammar and writing assignments as well as establish a connection to industry. By the end of the semester, I knew it was time to visit the dealerships.

Into the Trenches

Over a three month period, I visited seven Caterpillar stores and interviewed 23 service managers, supervisors, warranty administrators, and technicians, concerning five English-related areas: writing skills, speaking skills, listening skills, reading skills, and critical thinking skills. Through these interviews, I discovered which English skills were vital for the success of a technician and how I could transform my classroom into a valuable and productive course within the ThinkBIG program.

Scott Gasset, Quinn Company Technician and former ThinkBIG graduate, represents the attitude of all technicians interviewed when he says, “The service report is the most important piece of paper I fill out each day . . . it should sell my time.” The service report requires technicians to state the customer’s complaint, the machine’s cause of failure, any resultant damage, and—most importantly—the explanation of repair. If any area of the report is inaccurate or incomplete, the result is generally loss of time and money for the store. In the worst case scenario, Dale Smith, Service Manager at Peterson Holding, explains, “The customer may not want to pay the bill.” However large or small the ramification, a weak service report jeopardizes a technician’s credibility and relationship with his/her supervisor.

Due to the importance of service report writing, I have now created a two-day Service Report Writing workshop as part of my English curriculum. Hawthorne Machinery and Holt of California generously donated actual service reports to be used as learning tools for the students. Doug Armstrong, Service Manager at Hawthorne, also provided a myriad of handouts on service report writing while Holt’s Debbie Beldner, Warranty Administrator, shared an informative power point presentation. The dealerships have proven to be an invaluable material and intellectual resource. The next time I teach the course, students will have the opportunity to view

a range of service reports, from weak to strong and simple to complex, before being given the task of editing mock service reports.

The second change to my curriculum derived from questions concerning speaking skills, which technicians considered “very important” overall. In the shop, technicians consult one



Eric Henderson, Holt Technician and ThinkBig Graduate, prepares to demo a 735 Articulated Truck.

another on a daily basis, frequently communicates with their supervisors, and only occasionally speaks with customers. In the field, however, technicians routinely speak with customers and, on occasion, meet with hostility. Therefore, field technicians must be *more than* articulate; they must be tactful and courteous as well as keen listeners.

Both field and shop technicians explained that speaking skills and listening skills go hand-in-hand. If they do not listen carefully, the results could be disastrous (e.g., driving to the wrong location or working on the wrong machine). Sometimes, a customer’s complaint simply requires interpretation; the technician has to listen carefully to understand the problem.

To help prepare my students for on-the-job speaking skills, I have added an oral report component to the curriculum. First, the students will write an evaluative essay, comparing electro-hydraulics to pilot control hydraulics. Then, they will present a five-minute speech on the same subject. Since the students cover this material in CAT 87 one semester prior to taking Preparatory English, it will still be fresh in their minds.

As with the argumentative essay on brake systems, the evaluative assignment on hydraulics will engage the students as they write and speak about a meaningful subject matter. This kind of “doubling” also reinforces the significance of the career tech content and allows students the opportunity to further digest the career tech material, as they review it twice.

The most surprising discovery during the interview process was the significance of reading skills in the workplace. Because the heavy equipment industry is constantly evolving, technicians keep up-to-date by reading service letters, magazines, manuals, and procedures. According to Dennis Madden, Service Manager at Johnson Machinery, “If you can’t read well, you’re going to hit a roadblock when trying to progress as a technician.” While technicians will sometimes read about a machine the night before, they will more commonly spend 15-20 minutes on the job, reading about an unfamiliar system. This means technicians must be able to quickly comprehend complex matters. Bob Winslow, a veteran technician for Holt of California, sums up the importance of reading ability in this way: “If you can’t read and comprehend, you’re dead in the water.”

Although the standard curriculum for Preparatory English addresses reading comprehension to some degree, I have acknowledged this industry need by creating additional reading comprehension assignments, using two primary areas of Caterpillar’s Service Information System (SIS): Testing and Adjusting, and System’s Operations. The students will

have a limited amount of time to read the material (simulating a workplace situation) and then answer a series of content-related questions. This material will also correspond to Carter's CAT 90 curriculum as another link in our learning community. I will also stress the importance of thoroughly and carefully reading assignments, particularly directions. This simple but relevant task will prepare students to read work orders more conscientiously.

The importance of critical thinking skills in a technician's everyday activities cannot be understated. Whether diagnosing or repairing a machine (or even, in some cases, reading a work order), technicians rely heavily on their analytical, interpretative, and problem-solving abilities. However, shop and field technicians agreed that knowledge of proven methods is not always sufficient to "get the job done." During these times, they draw on their *creative* thinking skills. Armstrong believes that these skills, in particular, play a "huge" role in the success of a technician: "The answers are not [always] going to come off the computer; they're not going to be written down. There's more than one way to skin a cat." If a proven method of diagnosis or repair is not working, a technician *must* be willing and able to consider alternative ideas to complete his/her task. Technicians clearly need a balance of critical and creative thinking skills in order to fulfill their objectives.

To enhance the critical thinking component of Preparatory English, I have added the second CAT-specific essay on evaluation (as already described). In order to sharpen their creative thinking skills, students will write in-class journal entries related to their textbook reading assignments. I have also collected stories of creative diagnosis and creative repair from interviewed technicians and will share these real-life examples with students to emphasize the importance of on-the-job creativity. "One of Caterpillar's sayings," relates Armstrong, "is

beware of preconceived ideas.” I intend to reiterate this industry motto within the classroom while fostering an environment that stimulates creative thinking.

Lessons from the Lab

During the spring semester, I had the opportunity to observe the ThinkBIG students on multiple occasions during the lab segment of CAT 92 (Caterpillar Engine Performance), a course also taught by Carter. Visiting the lab was especially enlightening because Carter and the



ThinkBig Instructor, Dan Carter, engages students in the Caterpillar Engine Performance lab.

students often utilized role-playing to simulate the workplace. For example, in one particular exercise, Carter assumed the personas of customer and operator while students acted as technicians at a Caterpillar Dealership who had to correctly diagnose and repair an oil-related problem on an operating machine. In groups of five, the students examined the customer complaint and a brief background of the machine. Then, they created a series of questions to ask both the customer and the machine’s operator. Carter’s responses were intentionally vague and incomplete, forcing students to rephrase questions, ask additional questions, and formulate their

own conclusions about the machine's failure before turning to the diagnostic equipment.

According to Carter, 85% of the machine's diagnosis could be completed at this phase if the students asked the right questions. "Work smarter," he advised the class, "not harder."

Observing students in the lab allowed me to see the key skills I had learned about at the dealerships put into practice. The students, in the role of technicians, first used their reading skills to glean information from the mock work order. Next, they exercised their speaking and listening skills by communicating with obtuse "clients." Finally, by asking numerous questions, they utilized their critical thinking skills to eliminate possible causes of failure before manually diagnosing the machine. As a simulation of the workplace, the lab was both instructive and validating.

Building a Future

Reflecting on the learning community Carter and I have created and the interviews I conducted at the Caterpillar dealerships, I have come to realize something very profound. When disparate worlds collide—in this case, Preparatory English, Caterpillar Undercarriage and Final Drives, and the Caterpillar Dealerships—the results can be dramatic and spectacular for all involved. When barriers fade between career tech education and academics, the students and instructors mutually benefit as courses become more meaningful and students become more engaged. Industry greatly benefits as well, receiving better prepared employees.

When I enter the ThinkBIG classroom in fall 2008, I will bring something that I didn't have before—*credibility* as an English instructor in a heavy equipment program. I know of the students' specialized needs because I have visited the "trenches," and I have spoken with the men and women in the field. I now understand who my students want to be and what skills they

need to acquire in order to be successful. I have also learned some of the politics of the industry and have gathered advice from service managers and experienced technicians to pass on to my students. The addition of applied English curriculum to the standard curriculum of Preparatory English has not lessened the rigor of the course. Instead, the industry-specific content has enriched the course overall.

This fall the theme of my ThinkBIG English course is “Performance, Presentation, and Pride: The Makings of a Caterpillar Technician.” These are the fundamental traits that were emphasized in the dealership interviews. Successful technicians are those who perform to the best of their ability, present themselves in a professional manner, and take pride in themselves, their occupations, and the Caterpillar franchise.

My goal in the ThinkBIG program is to help build better technicians—one class at a time.