

CASE STUDY: CAPT

PIs William Raley, Joanna Kile

www.capttech.co/

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EXECUTIVE SUMMARY

The Center for the Advancement of Process Technology (CAPT) was formed in 2002 to further support the work underway at the College of the Mainland (COM) in the process technology sector through a partnership with the newly formed Gulf Coast Processing Technology Alliance (GCPTA). ATE funding allowed CAPT to accelerate the impact of GCPTA by formalizing the materials associated with the new Process Technology (PTEC) program. CAPT created course materials, textbooks and training programs and leveraged the GCPTA to disseminate these educational supports. Ultimately, the GCPTA took on a national presence as the North American Process Technology Alliance (NAPTA). Recognizing that NAPTA has greater influence than COM, the center concluded its grant, and NAPTA absorbed the CAPT materials and took responsibility for ongoing review, dissemination, and certification exams. CAPT closed in 2011 with the work living on through NAPTA, which is the standard bearer of the PTEC curriculum.

PURPOSE AND BACKGROUND

The Center for the Advancement of Process Technology (CAPT) was funded in 2002 to further advance efforts at the College of the Mainland to support “the development of a highly skilled, educated and diverse process technician workforce for the chemical manufacturing, refining, oil and gas production, and pharmaceutical manufacturing industry sectors.”

Community College programs developed to meet industry need (1988-1994)

In 1988, the College of the Mainland (COM), a small community college in Texas, joined with Alvin Community College and Brazosport Community College to offer a non-credit course, “Introduction to Chemical/refining Process Operations.” Bill Raley, COM Technical Dean, was awarded a Carl Perkins Workforce Improvement grant to enhance content and student assessment. Industry began to recruit workers out of this course, giving preferential consideration to program completers. In 1989, several Houston area plants started requiring the completion of this course sequence to be considered for starting Operator positions. Within a few years, there were long waiting lists of students who wanted to enroll in the course. Other colleges, such as Brazosport and San Jacinto, also began to offer a one-year certificate program in Petrochemical Plant Operations.

In the early 1990’s, Mr. Raley gathered a group of academic and industry representatives and established the College of the Mainland Process Technology Advisory Committee. The committee was tasked with

The need for a new technician education model (1987)

Historically, the chemical and refining industry hired hourly employees in maintenance and operations. The majority of maintenance workers were prepared through an apprenticeship program. By 1987, the apprenticeship approach had declined and the workforce was aging, creating a pending crisis for the Houston area petrochemical industry. Compounding the challenge was the reality that the hiring process for technicians didn’t ensure that potential employees had the motivation and interest nor skills to succeed.

The Gulf Coast Process Technology Alliance forms to coordinate preparation efforts (1996-1999)

In 1996, college and industry representatives from across Texas formed the Gulf Coast Process Technology Alliance (GCPTA) to coordinate the education, training and professional development needed to promote economic and workforce development in process technology. Nearly 100 people across the country, including representatives from 30 major companies facing the same challenge, participated in GCPTA. GCPTA served as the vehicle for creating an extraordinary relationship between technical colleges and industry that resulted in a

developing a Process Technology AAS degree at COM, based on the work done at other colleges, as well as industry needs. The Amoco Company (now BP) recognized the need for investing in a talent pipeline and agreed to donate half of Mr. Dennis Link's time to COM for 18 months to help develop the degree program with Mr. Raley. By 1994, the AAS degree was approved by the Texas Higher Education Coordinating Board. Rising entry requirements for Operators further drove enrollments in the Process Technology AAS degree program (see Table 1).

sustainable talent pipeline for the local workforce. The executive committee was constituted to have more industry members than academic members to maintain industry's control of curricular issues. Each GCPTA member institution had one voting member and two industry voting members.

Table 1: Growth in the AAS PTEC program

Year	Reach	Students
1993	3 AAS PTEC programs in US	55
1996	10 AAS PTEC Programs in 6 states	1,200
1998	15 AAS PTEC programs in 8 states	2,500
2001	25 AAS PTEC programs in 10 states	7,500
2003	40 AAS PTEC programs in 15 states, Canada, the Virgin Islands and China	12,000
2012	47 AAS PTEC programs in 16 states, Canada, The Virgin Islands and China	15,000
2018	54 AAS PTEC programs in 23 states, Canada, the Virgin Islands and China	20,000

CENTER FOR THE ADVANCEMENT OF PROCESS TECHNOLOGY (CAPT) FUNDED (2001-2011)

By 1999, the operations apprenticeship program ended as companies utilized the AAS process technology program. The early success of this AAS degree and industry-academic partnership inspired an application to the new ATE program at NSF in 1999. In 2001, the Center for the Advancement of Process Technology (CAPT) was funded, allowing COM to further advance the PTEC program by detailing the course objectives, content, lesson plans, and instructor guides. CAPT also initiated an annual Critical Issue and Best Practices (CIBP) Conference to support the continuous improvement of process technology education. This work allowed the PTEC program to scale rapidly.

CAPT designed the PTEC workforce development program around a triad of stakeholders, continually asking:

1. What's in it for the college?
2. What's in it for the students?
3. What's in it for industry?

Though not as explicit, a fourth stakeholder was the community.

In Texas, every technical degree or certificate program is required to have an advisory committee, which must be chaired by an industry representative. Though required to meet annually, the COM PTEC Advisory Committee met quarterly and was deeply involved in all aspects of the center. The project team recognized that without the industry ownership, the program would be "dead on the vine." This group ran all advisory meetings yet were highly receptive to faculty input. When faculty identified a need, the industry representatives were able to mobilize funds or other support. The Advisory Committee handled all the financial investment, leaving the PI free to focus on curricular components, relationship building, and project management. However, CAPT struggled with a college president that was not as enthusiastic about the industry ownership over the CAPT program as the project team was. Administrative turnover further exacerbated the situation.

The eight-course sequence (Introduction to Process Technology; Process Equipment; Process Instrumentation; Process Quality; Process Systems; Process Operations Safety, Health, and Environment; and Process Troubleshooting) solidified through the CAPT grant met the needs of industry for hiring employees prepared with the requisite skills and knowledge. The Center, using industry subject matter experts and professional writers, refined the curriculum,

developed instructor guides and materials, and in partnership with Pearson Publishing and Prentice Hall, developed and published the textbooks.

At COM, only 30% graduate from the (open enrollment) PTEC program. Although COM would prefer to see a higher success rate, especially among minority groups, the reasons for the high attrition is seen as a positive for employers. Common reasons for leaving the program are that students are not interested in shift work, there are substantial math and science requirements, and high GPA and attendance are required. Most students leave after the first introductory class during which they learn about the demands of the work. Mr. Link notes that as an industry representative he's pleased that the program is tough, and the 30% that finish "have great potential to become long-term valuable assets in the manufacturing industry." That said, there is interest in seeing why 70% are unsuccessful.

Growth of the PTEC program

One of the stipulations in the grant was to provide assistance and mentoring to other institutions. Frequently, community colleges that existed near major industries like Amoco, BP, EXXON Mobil, Shell, and others were encouraged by these companies to contact CAPT for information and support. Over 30 institutions either visited COM or were visited by CAPT/COM or other GCPTA industry members.

The initial PTEC enrollment was 55 students at COM, with 42% female or minority students. Documenting the enrollment of females and minorities was pushed by industry in a concerted effort to be a leader in promoting gender and racial equity in employment opportunities. Industry consistently provides quality female and minority employees to help COM in recruiting and mentoring students and regularly provides scholarships or internships to qualified students.

The current enrollment at COM (2019) is nearly 500 students, with 51% female and minority students. Nationally, the growth of the PTEC program has been steady, currently reaching 20,000 students (see Table 1).

From the start all CAPT efforts involved deep engagement with industry, because as Mr. Link noted, "they're the ones that are going to hire the graduates." PI Raley attributes much of the success to the involvement of industry, beyond their initial investment.

PARTNERING FOR SCALE (2005-2011)

COM is a relatively small college with about 3,500 students. Other colleges in the network were serving 35,000 or more students and were

Value-added for companies: Prepared workers, reduced training costs

As part of the PTEC offering, many of the advanced students (those in their 3rd-4th semester) secure internships at local companies. These internships allow students to get hands-on skills, while the companies get to vet (and begin training) the interns for future employment. In one company, of the 150 interns taken on between 2002 and 2012, 127 received full-time job offers. In 2004, when the company calculated the economic impact of hiring through the intern program, they found they had reduced their training costs by \$345,000 (\$15k per intern) by reducing training time by 40%. After this measurement, they greatly increased the number of internships per year.

PI Raley said that the "graduates work safer, qualify for jobs quicker, are more productive and make better employees since they have a technical education they can relate to the engineering workforce." Hiring practices changed to seek Operators with a PTEC degree, send them to a one-week entry-level orientation, and administer an assessment to support customized training as needed. The BP company estimated that by raising the hiring bar, hiring out of the PTEC program, and adopting on-site mentoring, they saved \$1.25 million dollars in onboarding 83 technicians from 2001 to 2004.

Mr. Link and PI Raley commented that "What started out as a vision to transcend the Plant Operator position from just a 'job' to a well-respected 'career' has evolved into a model program for industry-community college collaborative partnerships on a global scale. Industry and college reps, instructors, and students who have been a part of the development and continuous improvement of the difference-making Process Technology A.A.S. degree program should feel extremely proud of their role in the journey."

PROJECT CONTINUATION (2011-)

NAPTA is the standard bearer of the PTEC curriculum. NAPTA audits PTEC degree programs in North America and endorses those that meet its criteria. Corporations and colleges pay a fee to join

resentful that COM had so much power and control over the instructional materials. In 2005, the GCPTA rebranded as the North American Processing Technology Alliance (NAPTA) (<https://www.naptaonline.org/>). For a school to have their PTEC program approved by NAPTA, it must offer the eight courses and convene a local, industry-led advisory board. This ensures that the college and local industry are closely collaborating to ensure that student development activities are appropriate to the local needs. The other colleges were more willing to buy into the NAPTA programming than that of COM because of the broader base of industry support and neutrality.

Recognizing that the CAPT PTEC program wouldn't spread independently, and struggling with an administration that was lukewarm about the center, CAPT decided not to pursue a renewal of center funding and instead transferred the programming to NAPTA. The CAPT board, with its heavy industry representation, also felt that a larger organization might be a better venue for the work of CAPT to spread. Although PI Raley "liked the idea of COM being the center of attention, I understood where they were coming from. The membership of CAPT was limited" and NAPTA would have a wider reach.

NAPTA (\$1,500-\$5,000/year for industry, around \$750/year for colleges), giving them access to all the curriculum and the potential to become an endorsed college.

According to the NAPTA [website](#), graduates of the PTEC program affect the bottom line for companies in a positive way as they:

- Increase plant asset utilization one to four percent
- Decrease employee selection costs by 80 to 90 percent
- Reduce two-year new employee turnover by 50 percent
- Drop job-training costs by 40 percent
- Result in 37 percent fewer safety-related incidents
- Reap an average of \$16,000 for every new hire made

NAPTA- affiliated schools benefit from networking with schools across the country, sharing best practices, participating in curriculum updates and networking with industry.

In 2010, BP and COM received the W.O. Lawton Business Leadership Award from the National Association of Workforce Boards, in which the nomination said of the partnership: "A strategic decision 16 years ago to forge a partnership between process industries and community colleges has yielded a better trained and better educated workforce today. A true test of leadership is to show others a way to go forward. The new generation of process technicians has gained much from the experience, determination and leadership of people like Dennis Link and companies like BP. What they and others imagined nearly two decades ago is industry standard today."

LESSONS LEARNED

The CAPT center had deep partnerships with industry early in the process. The Amoco Company (now BP) recognized the need for investing in a talent pipeline, donating a training specialist half time for 18 months to help develop the curriculum program. This ensured that the curriculum was relevant to the program and students.

The project was able to demonstrate measurable impact for industry in reduced training costs as well as safer and more reliable employees. Over time, the PTEC program spread to other colleges and industry partners based on demonstrated results.

The leadership team knew when to transfer ownership. The PTEC program was effective, but would gain more traction if a neutral, nationally recognized professional organization endorsed and managed the curriculum. Membership fees and a credentialing structure allow NAPTA to support the continuation of the PTEC program.