



**Survey Results: National Troubleshooting Competition**

**Held at Lone Star College  
Kingwood Campus**

**Students, Coaches and Judges**

**April 23, 2016**

## Introduction

Northern Oklahoma College (NOC) was awarded a grant from the National Science Foundation (NSF) to complete a project entitled: Developing Students' Skills in Energy Troubleshooting. Innovative Educational Consultants, LLC (IEC) was retained as the external grant evaluator. The grant was transferred to Lone Star College –Kingwood Campus in 2015. One goal of the grant is to hold an annual competition among qualified colleges and universities across the country that offer process technician programs. The teams came together and competed against each other as they attempted to solve troubleshooting computer-simulated scenarios. This was the third National Competition.

This was the second year that a Qualifying round of competition was conducted and the top eight teams from across the country were then invited to the National Competition. A separate study was conducted of those schools that competed during the Qualifying round whereas this study reports on the perceptions and indicators of those students who competed in the National Competition.

The Competition consisted of four timed rounds of competition with each round getting progressively more challenging. The Competition was held in a computer classroom where the simulation scenarios were preloaded onto the computers. The students had the opportunity to try a practice scenario and ask questions of the Simtronics and Systran Training & Technical Services representatives. (Simtronics was the vendor that supplied the simulation software, Systran developed the scenario simulations). Three judges were present for the competition, all experts from their representative industry fields, also present were the Simtronics and Systran representatives. At the end of each round they would score the teams. While the competition was taking place, no one was allowed in the computer room except the teams and the judges. The coaches and others could watch through windows during the competition. Lastly, at the end of the four rounds, the team with the highest cumulative score was declared the winner.

The teams in the competition were:

Bellingham Technical College

ITI Technical College  
Kenai Peninsula College – Anchorage Extension Campus  
Kenai Peninsula College – Kenai River Campus  
Los Medanos College  
Mississippi Gulf Coast Community College  
South Central Louisiana Technical College  
University of Alaska – Fairbanks

Sponsors for the Competition included Chevron, ConocoPhillips, Eastman Chemical, Lone Star College, Systran Training & Technical Services and Simtronics Corporation. The agenda for the competition is attached as an appendix.

This report will consist of feedback from the students, the coaches, and judges. The students and coaches in the National Competition were asked to comment on the Qualifying Round as well.

### Method

Student competitor feedback was collected via an online survey using Survey Monkey. Immediately following the fourth round of competition, the students went to an adjacent computer laboratory where they completed the survey. In this way, all 24 student competitors were able to complete the survey in a timely manner and while their impressions were still fresh.

The survey asked the students about their perceptions of various aspects of the competition such as difficulty of the scenarios, practice time, comfort using the software as well as thoughts about the venue, lodging, food, etc. They were also asked about the Qualifying Round as well. Results will be reported in percentages or whole numbers in addition to written comments that were provided.

There was also a survey sent to the eight coaches asking for their feedback about the competition. Five responded to some of the questions. Their responses follow the student responses.

A separate survey was sent to the judges and two responded. That response is summarized following the coaches' responses.

In some cases the survey results are summarized in text, some show the results via tables and relevant written comments are included with obvious spelling errors corrected.

Results

*Students*

Qualifying Round

Most students reported hearing about the Qualifying Competition from their instructor. Most also reported they had enough time to work on their scenario. Table 1 shows how the students felt about various aspects of the Qualifying round.

Table 1

**For the Qualifying Competition, please respond to the following statements**

	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
<i>The instructions presented regarding the Qualifying round were easy to comprehend.</i>	4.17%	0.00%	12.50%	50.00%	33.33%
<i>It was easy to logon to the system.</i>	8.33%	8.33%	8.33%	37.50%	37.50%
<i>The Learning Management System (LMS) used in the Qualifying Competition was easy to navigate.</i>	4.17%	4.17%	0.00%	54.17%	37.50%
<i>The screen shots illustrating the scenario were clear and readable.</i>	4.17%	0.00%	16.67%	33.33%	45.83%
<i>The instructions for submitting our answers were easy to comprehend.</i>	4.17%	0.00%	4.17%	66.67%	25.00%
<i>I/We did not have any problems submitting our answers.</i>	4.17%	8.33%	8.33%	37.50%	41.67%

Written comments for this question were as follows:

- In our qualifying round, the screen shots were somewhat illegible from a thin trend line being printed against a black background.

- I felt they made the experience as great as it is because of Leadership, Encouragement and provided Familiarity to each other of the process in each activity. Had heard about the competition a little later than expected, Maybe some simulators could have been provided for a better group practice session.
- It would be helpful to have corrective and compensating actions defined clearer.
- Our only issue was with the password
- A little more instruction on where the normal parameters would be nice I missed them on the first one.
- We had some issues logging into the system and delayed us about 1.5 hours because we were having to correspond with LMS.
- The initial instructions on how the qualifying round was implemented were vague. We were unsure at the beginning on how the qualifying round would be.
- It was apparent that there was a pattern to the questions at the end of qualifying
- I do not know what our logon issues were but we were unable to logon for about 30 minutes during the qualifying round.
- Proctor had issues with understanding log in order for proctor and students. Directions were a little complicated.
- Our team did have an issue with the original login. Our information was not accepted to get into the LMS. The screenshots were fairly easy to read. Some of the colors however, were slightly difficult to see.
- Would like it to be live and not a paper test.

Generally speaking the comments are positive although there may have been a few login issues.

Lastly, the participants were asked how the Qualifying Round could be improved. The relevant comments follow.

- A list of design conditions and upset conditions should be included.
- A little more advance notice would have allowed for some more prep time.
- I felt the qualifying round had a lot of information on the basis of processes, If they could enforce longer practice time, and a variety of simulations to competitors it could help out.
- Giving candidates a few more screen shots to notice trending values easier.
- More complete information before the round would have helped us know how to prepare.
- More info about the scenarios
- I like to be able to use the computer in real time not on paper, but that is just personal preference.
- Less questions that involved selecting "what would you do" because we got some questions wrong because we checked things that would be okay to do, but not critical to fixing the issue.
- More information communicated on how it would be given. Also, I would say not give the answers to the questions. Give a score and then move on to next round.
- I felt it was a sufficient process
- Before the qualifying round we thought that we would be running the simulator for that round. We did not realize that it would be printouts with questions to answer on the computer. However the instructions we received when we arrived did make it clear what we needed to do.
- Multiple selection answers were a little vague on how many to select or if selecting multiples counts against score.
- The qualifying round was a pretty straight forward ordeal. I feel you guys have that part well under control.
- We accidentally clicked the backspace and it ended the exam. Maybe something warning of that hazard more clearly would have be nice.

- The instructions the proctor and students received had minor differences that led to some confusion initially.
- Would like it to be live and not a paper test. Would also
- The number of potential answers could have been indicated.

The comments reflect a positive attitude towards the Qualifying Round with no real issues presenting.

### National Competition

Twenty-one of 24 students reported that they had access to Simtronics software. This represents seven teams with access and one without (Bellingham). All but one student reported feeling comfortable using the software. Two comments were offered:

- I had to say no simply because I had never used Simtronics software until less than 24 hours before the competition. An online tutorial would have been a great help.
- We did not know that you actually have to click on process variables in an alarm state to dismiss the alarm. It would have saved a lot of time had we known that.

The next several items asked questions directly about the competition itself. Students were asked to rate their level of agreement on several statements. The responses were Strongly Disagree (1), Disagree, Neutral, Agree, Strongly Agree (5). Table 2 below shows the score for each individual item.

Table 2

	<i>Weighted Average</i>
<i>The time allowed for the Practice/Warm-up session was adequate.</i>	4.58
<i>The Q&amp;A with Simtronics support was helpful.</i>	4.54
<i>The time allowed for the first round of competition was adequate.</i>	4.63
<i>The level of difficulty was challenging.</i>	4.46
<i>I believe my team got the correct answer in round one.</i>	4.50
<i>The time allowed for the second round of competition was adequate.</i>	4.00

<i>The level of difficulty in the second round was greater than the first round.</i>	4.08
<i>I believe my team got the correct answer in round two.</i>	4.00
<i>The time allowed for the third round of competition was adequate.</i>	4.38
<i>The level of difficulty in the third round was greater than the previous two rounds.</i>	4.13
<i>The level of difficulty was manageable.</i>	4.17
<i>I believe my team got the correct answer in round three.</i>	3.96
<i>The time allowed for the fourth round of competition was adequate.</i>	4.50
<i>The level of difficulty in the fourth round was greater than the previous two rounds.</i>	3.75
<i>The level of difficulty was manageable.</i>	4.08
<i>I believe my team got the correct answer in round four.</i>	4.21

As can be seen, all scores are 4.0 or above (on a scale of 5.0) with the exception of “I believe my team got the correct answer in round three.” and “The level of difficulty in the fourth round was greater than the previous two rounds.” Interestingly, the problem in round four was not the difficulty but the introduction of a shift change may have given the impression that the scenario was more difficult.

Three new additions to the competition this year included incorporating a virtual field operator, a new process unit and the above mentioned shift change. The students were asked directly about these. First, here are the comments regarding the field operator.

- Personally, I really liked the VFO, as it added the dimension of not being able to monitor and control everything from the board.
- It was a good way to communicate, although if 2 screens were provided it could make it more hands on. I think the operations were adequately projected for starting process. I would not change anything about this addition.
- It was perfect. I liked the way we got a real life scenario out of it.
- The VFO was good. It was a nice addition, it could have been utilized more however.
- This was entertaining. It may have been a slight challenge for our group because none of us are gamers, but the concept was very cool. One thing that would be nifty to add are some visual clues that we actually see in the process, such as val position, in the VFO all the valve stems were fully

exposed, which as a visual in on the job, says, that valve is closed. In the VFO though, that's just how they looked regardless of position. It's a small thing, but would make it more lifelike.

- As the program is expanded I think it will prove more useful but for this exercise I thought that the field operator didn't have very much to do. The controls and map were very easy to navigate and well put together.
- I especially enjoyed the vfo. I thought it was very well done and don't have a lot to advise on it.
- Good addition for learning and interacting in real world situations. Additional realism will help eg: valve opening times and potential troubleshooting issues noticeable by field tech would help.
- The scenario was good but more time would have allowed us to finish lining up the column.
- The VFO was fun to use and added another level a realism to the competition.
- It was a great experience, creative idea, and I believe it could be a fun way to make our classes and training more exciting and "hands on" ish. It may be too expensive for it to get out there however. There are some things I would add such as a real flame coming out of tower. maybe a smoking pump when failed. Just to make things more realistic.
- Really neat tool for someone who has never been in a plant
- I think that it is a good addition. I think that in order to make it more effective you would have field operators and control room operators in separate rooms but I do realize that would require a more difficult and complex setup.
- I liked the VFO and would like to have had it at school to practice with
- Be able to see values on transmitters in first person view. Make the field operator walk a little faster.
- I was really impressed. I would love to have a way to communicate with the VFO operator too keep our thoughts and ideas on problems closer to ourselves than having to talk louder to the operator.
- It should be implemented in the classroom. It gave a real life feeling to what the process technician is expected to do
- I thought the VFO was very intuitive and helpful to gain knowledge on the real world environment for an operator.
- It was a pretty neat tool and would be beneficial for practice purposes if we were in different rooms
- needs improvements
- I think the VFO scenario was an excellent addition to the process. I would like to have had another scenario with the VFO.
- I would have liked a better communication system with my F operator. I would have also liked to see a faster moving avatar.
- I enjoyed the VFO the most. More steps should be added so the operator of the VFO can do more.
- It was awesome

By and large, this addition was well received. Comments included “excellent addition”, “perfect” and “real life”.

Comments about the shift change included,

- I liked the shift change, as it adds the dynamic of having the opportunity to demonstrate a pass down.



- I feel it holds a lot of responsibility on the team to adequately interact with system start up. It was interesting to see of the other individual reacts to the faults and new conditions that we've looked at to correct.
- Just like virtual simulator, we mimicked a real life plant scenario and it obviously made it slightly more challenging.
- the shift change was interesting. it didn't make the scenario harder, but it slowed us down. A full change (one in, one out) might be more exciting.
- This was a great addition, however, it more or less felt like a coworker showed up late to work and happened to arrive during a system upset. It was nice to be able to have the whole team there to complete the round, but it did not quite feel like a shift change.
- I think the most useful training technique was having the "late" operator take over the board. It would have been far less beneficial if they just came in and could just sit there.
- The shift change was great. It added a realistic upset to the situation that was comfortably challenging
- Good twist, again more realism could help here. Such as change out notes or having the starting operator leave the room after a certain amount of time.
- It was a good exercise of communication skills
- I was the shift changer for my group. I was surprised at least for me, how long it took to get my bearings of what was going on. It made me realize that after a real shift change after two weeks off, it would be difficult. At first I thought it was silly, but after wards I felt it was a good additive!
- The shift change would be more effective if the person/people you relieve actually exit the room
- I thought it was also good because it forced another person to sit in the driver's seat. It also forced teams to employ their communication skills.
- Good to relate what is happening in the process to the relief
- More time should be allowed for the shift relief operator.
- I loved the idea I would probably have the person taking over actually completely take over and require the others to leave the room. To actually simulate a full shift change.
- Again, it gave real life feeling to what we do and really helped build the teamwork aspect of the competition
- The shift change for my team wasn't very difficult. We all communicated very well and the transition was smooth.
- It brought an added dimension to the competition, but was fairly easy to navigate
- It was ok
- I think shift change was a good addition. It creates a realistic scenario that is experienced in the field.
- it would have been more realistic if the operator had to leave after shift change.
- I liked this addition. It made the scenario more realistic.
- A true shift change should remove one of the team members to make it more difficult

Once again, the comments were very positive. Interestingly, several commenters suggested that the operator being relieved should exit the room to make the scenario more realistic.

The third scenario used in the competition exposed the students to a new process unit. Again, an open-ended question was posed to ascertain their thoughts.

- I had run a similar unit on another simulator in the past. This unit was comparable.
- In the dehydration it was very fun to see how the real world has symptoms that trigger upsets, With better knowledge of what to find and correct these situations makes the experience great.
- That was a great addition. Everyone was challenged equally and made testing more fair.
- I enjoyed the dehydration unit. Being surprised by its addition as well as having time to prepare made it a good scenario.
- This was a really interesting process! I really enjoyed the fact that we got to troubleshoot a unit we have never seen.
- Because we had so much time to review and look at the unit, I thought it was easier to understand/figure out the issue. Definitely a beneficial addition to the competition.
- The glycol dehydration unit was interesting. I enjoyed working it.
- Interesting scenario very useful to real life TEG skids discuss in other courses.
- It was challenging, which isn't necessarily bad
- This should be a practice that is continued as it puts all teams on level playing fields.
- I had just learned about this unit in operations class so i was excited to put it in action. Everything lined up on how I learned. Very well put together model.
- Interesting unit, not necessarily something I would introduce at a competition where little is known about the process.
- I liked that something new that nobody had seen was added to the competition. It probably helped to level the playing field for anyone who did not have access to Simtronics before the competition.
- Thought it was a good scenario
- More difficult than previous units ever reviewed.
- It was challenging but very good unit.
- We have covered gas dehydration in the classroom but not on simtronics. It was fun and challenging
- The new process was interesting. I had some exposure to that process in my instruction in the classroom. The problem created was challenging.
- It was very challenging, difficult but realistic
- lack of information
- The third scenario was good. It was a little more difficult because we had not been exposed to it but i felt it matched the concepts being taught in school.
- It was a solid unit, i would have liked to be able not two just run a design but maybe practice problems as well.
- It was a challenge, but it was enjoyable.
- The unexpected unit was challenging and should be used more often.

Once again the comments are very positive. One student pointed out that since no one has worked with this type of scenario, it helped “level the playing field”.

The next set of statements asked about the Competition accommodations (Homewood Suites), competition venue, time of year, food, etc. All topics, hotel, competition venue, computers and food, in this question were positively rated.

A series of statements asked general impressions regarding the competition such as enjoying the competition, enhancing of trouble shooting skills as a result of the competition and did their program adequately prepare them for the scenarios. All these statements had a very high degree of agreement. Comments about their program preparing them included:

- Natural draft fired furnace - draft and fuel delivery problems. VFO - distillation column startup Glycol Dehydration unit - stay on spec with multiple faults occurring Run the distillation unit with multiple faults and a shift change.
- We had many forms of resources, simtronics software, practice scenarios, overlook on troubleshooting, troubleshooting objectives, and lots of monitoring on various equipment
- The 700 unit is our most used module in our classes. It was fun to see it in the competition because I already knew the system. Its complex though, so when things go wrong, it is a challenge to get it back to normal. I feel like my training in school all related to this competition very well. I am happy to have been a part of it and would like to see it continue.
- 1 - we've talked about furnaces since my first PRT class, so having a good knowledge of them helped fix the problem. 2 - We have a distillation tower trainer at our school, so working with that helped understand temps, flows, equipment, and just having a good overall understanding of the process. 3 - I didn't have much exposure to gas driers before the competition, but I learned a lot in being able to talk with our coach about them. 4 - Again, similar to scenario 2.
- A better understanding for students on grading criteria would help to make decisions more effectively. For example, knowing whether ending the scenario early when near spec is worth it or waiting for exact spec to occur. If you stay up till the 45 min even though the process has been stable for a long time does this hurt your score?
- We practiced distillation columns but don't have access to any of the modules used in the competition.
- On scenario 4, it takes a long time to see changes in the system when changes are made to it. I understand that in the field there may be times where you have to wait and see what happens, but in a 45 minute scenario, there is not much time to wait and see.
- I think all scenarios were exciting and challenging. However I wish they wouldn't have done the SPM 700 twice.
- Our program teaches us how to think through systems, how to think of things at the molecular level, and how to use our knowledge of process equipment, systems, and instrumentation to solve problems.
- Superheated boiler Fired Heater Distillation system All of these were accessible to us to review before coming to nationals.
- In my troubleshooting class we go over almost all of the scenarios that we did today so my class helped me prepare really well for this competition.
- We go over distillation a lot in quite a few of our classes, it is a comfortable system. the gas dehydration unit made us think a bit more and apply process knowledge

Based on these comments it seems that the students were prepared for the competition as a result of their programs at their home institutions.

The last series of questions were all open ended. The first was "What has been the most valuable aspect of the competition for you?"

- The experience of traveling to Houston and experiencing hospitality unknown in other parts of the States. Networking with folks and meeting people from around the country.
- Meeting all the people associated to putting the competition together. They're the best outspoken people that encourage people to finish the event feeling happy.
- Meeting new people, seeing different perspectives of simulators.
- Networking.
- The networking treasure hunt was great. Yes, the competition was good as well, but the professionals that were brought in were great people to talk to and I am very thankful that I had the opportunity to meet them.
- The networking, learning about other ptech programs around the country and getting exposure to more processes.
- The team work and competitive aspect was fun and very beneficial.
- Interaction with students and professionals outside the local program. This provided further insight into careers and training outside of what local programs alone could offer.
- Exercising my troubleshooting and teamwork skills
- It has provided an excellent learning opportunity in team building and problem solving.
- Feeling the pressure of the competition helped feel what it's probably really like out in the field.
- Teamwork and synergy
- Competition adds pressure to the work you are doing. Running a simulator in class does not put you under too much pressure because you really don't have anything to lose. When troubleshooting a problem in a real life situation there will be pressure to get the correct solution in a timely manner. The competition itself helps to put some pressure on you to get it right.
- practice on the simulator
- The experience of the mentors who put on the competition.
- The experience and getting to meet new people and possible employers.
- Networking and the value of teamwork in this industry
- The networking and learning experience is great.
- Just the additional experience in troubleshooting and use of simtronics
- The preparation process
- Networking with other students and representatives from the process industry.
- Meeting people in the industry, as well as seeing downstream production. Although I would have liked to have seen more upstream.
- Interacting with other people in my field of study.
- The practice in troubleshooting in a timed environment

It is significant to note that 14 of the 24 responses mentioned networking in some form as the most valuable aspect of the competition. This is noteworthy for program managers to keep in mind going forward.

Next was asked, "What could have been done to make this experience better for you?"

- Nothing. (4)
- More interactions with all the competitors
- It would have been better if the students qualifying for the competition had been given access to systems from 500-1500, directly through simtronics to get a deeper understanding. Not all schools have all the systems. And students can't get it on their laptops. So if the students are given

a chance to use Simtronics before qualifying round and those who qualify get to keep practising until the competition is done and afterwards the access may be revoked.

- The competition felt rushed, a little more time to relax or get settled would have been appreciated.
- The experience was great. Accommodations were higher than expected.
- It would be nice to have a second computer screen for running the scenarios.
- I wish we would have been given multiple monitors for the console operations.
- Having it in Hawaii, jk. Great experience top to bottom.
- more time to finish challenge #2
- We could have done better on the startup procedure for sure on scenario 2. other than that it was very fun.
- Less conference based talks, more learning or technical teaching. Felt like this was more a business/marketing seminar than a process affiliated event.
- Overall, I think the competition is on the right track. I think that continuing to add new things each year (such as the now model and the shift change) is helpful to really put people to the test.
- Possibly more practice on the computers once arriving at nationals.
- I would love to go on a tour if they had an extra day or two.
- I wish scores were given after each round so that we could know what to improve upon or where we might be going wrong
- Increase the industry involvement. More representatives for a variety of companies.
- Might could've been better prepared for some of these scenarios, wish we'd had more time running other process upsets prior to the competition
- Follow my first answer and limited my time overthinking
- To allow family and friends either watch or attend the awards. I think more PR for the comp is a must!!
- More process representatives could have been present

No clear theme emerges from these comments. A couple of people note that perhaps more interaction with other competitors or industry representatives would have been desirable. One person mentions getting answers after each round. A couple of people mention having a second monitor. Generally speaking, no one item emerged as lacking in the competition.

Next was asked, “Why did you want to participate in this competition?”

- I enjoy a challenge, and it sounded like a fun thing to do
- To be a better troubleshooter, and take the knowledge that I have now and expose it to training positions I have in line to my life.
- I wanted to enhance my learning and gain more experience.
- I like to compete.
- I like to stretch my boundaries and take on once in a lifetime opportunities. This competition relates directly to my favorite part of my training. Troubleshooting is very entertaining for me, I enjoy solving problems. So, there is no way I could have passed this up.
- Both to increase my process knowledge and to have another thing to put on my resume.
- To test my skills and increase my marketability
- Great experience and for personal resume. Potential networking was helpful as well.
- To destroy my enemies and drive them before me (just kidding). To test myself and see how my school's PTECH program compares to others across the country

- I wanted to do something that would help me to stand out from my peers.
- Because I knew it would challenge my skills and I love trouble shooting.
- Networking and meeting potential employers
- I thought that it would be a good way to my troubleshooting skills to the test and see if I was where I should be at this point in working towards my degree.
- wanted to represent my school
- Further my trouble shooting skills for when I possess a position in operations for a chemical plant or refinery.
- I love troubleshooting different problems from cars to process problems so I thought this would be a great opportunity to take advantage of.
- To learn everything I can about the industry
- It sounded like a great experience to gain knowledge. I am a competitive person. Also this is good for my resume'.
- Several friends from school wanted to compete
- The experience
- To gain more experience in the industry and meet individuals from other areas of the country. Also, to improve my resume for potential employment.
- To showcase my skills and add to my resume hopefully aiding me in getting a job after school.
- To learn more about troubleshooting and find people that work in operations.
- Enhance my skills and networking opportunity

A couple of themes emerge from this question. Experience, competition, build skills and resume building are all items that have multiple mentions. These all are valid reasons for wanting to participate in the competition.

Lastly, they were asked, “Do you have any other comments or suggestions?”

- (Name redacted) I would love to have a couple of days to think about this. Perhaps a follow up email would be a good thing.
- I feel they made it really clear on the values I can obtain after the competition. I had a wonderful time and believe this can help me move forward in my process technology career
- I really liked the addition of an unknown system that no one has seen before. I learnt a lot and I liked how the field operator was asked to do his job in field using simulator. It gave a feeling of real life scenario. I would like something interactive with the designers of this competition, where people in groups can learn something in process troubleshooting from a real life scenario, through direct teaching of the test organizers. It would be a great learning experience. I enjoyed meeting the personnel where I had to fill out the questioner. My overall experience was great.
- Thank you for making this available to us process tech students. I very much hope you guys gain the sponsorship needed to continue this competition. It is a wonderful opportunity for all of us. Very well organized and reasonable about using real world problems that may happen in the field. Thank you again.
- It has been a very good competition and very helpful in increasing my process knowledge and connections with industry around the country.
- Thanks for everything!
- Great job by the hosts and the simtronics team.
- no (6)

- Great job, and Thank you all for putting this on. Greatly helped me.
- First day should be brief and concise, not so drawn out and tiring.
- I had a great time.
- Thank you for the opportunity.
- I enjoyed the competition but I feel it's a bit much to do in one day. Fatigue definitely played a major factor
- Better study material to send to our schools prior to the competition.

No single theme emerged from this question other than that all comments are positive or constructive.

### Demographic Data

All the students fell into three age categories, seven in the 18-25 age range, 14 in the 26-39 age range and three in the 40-54 range. Last year the 18-25 group was the largest. Twenty-two (out of 23 reporting) students reported being male (upon observation only one female participated) and 67% were Caucasian with two students each declaring as African-American, Asian or unknown/not reporting. One each reported Hispanic and biracial.

The following two tables show which semester the students were in for their Process Technician program and when they will be completing their program.

Table 3 – Semester of Program

<i>Semester</i>	<i>Number of students</i>	<i>Percentage</i>
<i>1<sup>st</sup></i>	0	0
<i>2<sup>nd</sup></i>	6	25
<i>3<sup>rd</sup></i>	6	25
<i>4<sup>th</sup></i>	8	33
<i>5<sup>th</sup></i>	1	4
<i>6<sup>th</sup> or greater</i>	3	13

Table 4 – Program Completion Timeline

<i>Semester</i>	<i>Number of Students</i>	<i>Percentage</i>
<i>Spring 2016</i>	9	39
<i>Summer 2016</i>	4	17
<i>Fall 2016</i>	7	30
<i>Spring 2017</i>	3	13

Twenty-three of 24 students reporting having a GPA of 3.25 or higher with 17 reporting a GPA of 3.75 or higher. Four said they were a veteran and four received scholarship money to attend their PTEC program. Five said they were a double major, three of them in instrumentation. Lastly, eight of the students reporting having earned a previous degree. The degrees noted included:

- Bachelors of Business Management
- AA Journalism
- BA degree in History
- as in computer info tech and as in business admin
- AOS in Automotive Technology and AOS in Auto Body Collision and Repair
- CCAF - Aviation Operations
- B.A. Soc.
- BS in Physical Education, MS Physical Education

One person reported being in a previous competition but did not provide any specifics.

#### *Coaches*

The five coaches that responded to the survey heard about the competition from multiple sources including, North America Process Technology Alliance (4), Martha McKinley (2), and the PTSE website. Four out of five coaches had access to the software at their school. Also, four out of five coaches reported thinking that their students felt comfortable using the software during the competition, with one commenting “Not to start with. They had some practice the day before, however it was not enough. It took them the first round before they figured out how the alarms worked. They did get more comfortable by the second round and better each time”



The next several questions asked questions directly about the Qualifying competition. The coaches were asked to rate their level of agreement on several statements. The responses were Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. All coaches either Strongly Agreed or Agreed on each statement regarding the Qualifying round. The statements included:

- It was easy to retrieve the material for the Qualifying round (downloading, printing, clarity of instructions, etc.).
- The information presented regarding the qualifying round was easy to understand.
- Accessing the LMS was easy.
- The time allowed for the scenarios seemed adequate.
- The instructions provided to the teams were easily understood.
- The levels of difficulty of the scenarios seemed to be manageable for the students.
- I/We did not have any problems submitting our answers

When asked how the Qualifying round could have been improved, three responses were offered.

- Prior information on how the competition is scored would be helpful in preparing the competitors.
- Everything worked well.
- It was good. one thing that would have been nice is to have a little more notification to make arrangement's between rounds of competition.

Coaches were asked if their institution could host a Qualifying Competition next year. One said “yes”, one “No” and two “Maybe”. The following comments were proffered:

- Biggest question for us is funding.
- Our school does not have the facilities to host the competition.
- We only have envision simulator models, which might be a problem? Bellingham is located right in the middle between Alaska, Los Medonos and there is a PTEC program in Montana. We have several nice facilities, brand new library and new computer facilities, a regional airport as well as Seattle.
- But being from Alaska, the travel from the lower 48 for all other teams could be costly.

With few exceptions, all coaches Strongly Agreed or Agreed with the following statements regarding the National Competition:

- Your team felt they had sufficiently prepared for the competition.
- The time allowed for the Practice/Warm-up session was adequate.
- The Question and Answer sessions provided were helpful.
- The time allowed for the first round of competition was adequate.
- Based on feedback from my students, the level of difficulty was challenging.
- My team got the correct answer in round one.
- The time allowed for the second round of competition was adequate.

- Based on feedback from my students, the level of difficulty in the second round was greater than the first round.
- My team got the correct answer in round two.
- The time allowed for the third round of competition was adequate.
- Based on feedback from my students, the level of difficulty in the third round was greater than the previous two rounds.
- My team got the correct answer in round three.
- The time allowed for the fourth round of competition was adequate.
- My team got the correct answer in round four.
- The levels of difficulty were manageable for my students.
- My students' troubleshooting skills in general improved by preparing for the competition

The only exceptions were one or two coaches indicated less than Agree on whether his team got the correct answer. Written comments included:

- My team and I were unclear as to how the competition was being scored and felt our strategy was not adequate to maximize the score. For example, how important is it to clear alarms right away and stabilize the system. Making the scoring clear rules clear before the completion would be very helpful in coaching and in training students. A tutorial on scoring will be helpful otherwise we are running blind.
- Even if a team did not win at the competition, there troubleshooting knowledge increased while preparing for the competition.
- Not have access to simtronics simulator was a slight handicap, but not major and not enough to have made a difference in the outcome. If there could just be a bit more practice for those who are not used to using simtronics that would be great.

Overall, the coaches expressed a positive attitude towards the Competition. They seemed to be less concerned about not having Simtronics access during this Competition than previous Competitions.

The next set of statements asked about the Competition accommodations (Homewood Suites), competition venue, time of year, food, etc. All agreed that the accommodations and food provided throughout the competition was adequate, the venue for the competition was comfortable, and the provided computers were sufficient as well as the Saturday evening banquet venue was satisfactory. Comments included:

- The hosts were great and made us feel very welcomed. Flight and transportation arrangements were perfect.
- Team members should not have to share a room.
- I thought everything was exceptional!
- Great place.
- The hospitality was awesome. It was such fun for all of the students. Great opportunity to network.

In an open ended question format, the coaches were asked about the inclusion of the Virtual Field Operator (VFO) scenario. The responses included:

- I felt the VFO brought a touch of reality to the competition and made it challenging and fun.
- This was a very good addition to the competition. I think all the students loved it.
- The VFO is going to be a great addition to any simulator for learning. It fits with this generation of learners.
- Students felt this was the most challenging.
- The students loved it. they were impressed with the reality of it.

Also, in an open ended question format, the coaches were asked about the inclusion of a new process unit, these comments included:

- Great addition to the competition, it requires students to use past experience in a new manner.
- Very good addition. Placed all students on the same playing field. Tested there knowledge of plant equipment, systems, and its operations.
- Everyone had an equal chance to do well on the new scenario. I believe it comes down to basic trouble skills and process knowledge
- The students seemed to adapt to the challenge.
- We had reviewed the scenario in the Pilot and we use it at our school.

Lastly, an open ended question addressed the addition of a shift change. The responses were:

- Again, excellent addition and tests the student's ability to be flexible and to adapt to new circumstances.
- Another very good addition. The will have to do this as an operator. I have added this to two of the classes I teach
- (troubleshooting and capstone).
- Shift change is daily reality. It happens and we have to deal with it. I liked having the shift change. Keep it.
- For a true shift change, someone should leave.
- That was great. The students felt like it was very realistic.

It is clear that all the new additions to the competition scenarios were well received and endorsed for future competitions. These responses are in agreement with student feedback as well.

All five coaches Strongly Agreed they enjoyed the Competition, would recommend it to fellow instructors, felt that the time of year was convenient and felt that their student's knowledge about process technology increased as a result of participating in the competition. These are the best results of the three Competitions held to date.

A series of open ended questions followed regarding the Competition in general.

The following are their responses to commenting on what they considered the strengths of the competition.

- It gives students an opportunity to test their troubleshooting skills with students from other schools and emphasizes the importance of troubleshooting in industry. An opportunity to network with industry representatives and other students.
- The increased troubleshooting knowledge that the students gain.
- Focused on the students! Everything was directed towards ensure the students experience was the best it could be. The treasure hunt /quest for knowledge was awesome. It was great that so many volunteers were there to share their knowledge with the students.
- The students got to meet others in the process technology major.
- Overall knowledge increase for the students. Opportunity to network and learn about others

And what was most beneficial to their students...

- The challenge and the opportunity to determine how good they actually are in troubleshooting. They returned home determined to get better at the skill.
- Being able to test their troubleshooting knowledge against other students.
- It is toss-up between getting a chance to participate in competition and evaluate where they are relative to others was huge. Having the opportunity to listen to and meet so many people who have experience in business.
- They really like the bragging rights. And to list this on their resume. They all feel that this will give them an edge in landing that first operator job.
- They all felt like they learned a lot that they can take to a job. Great experience for every student.

When asked about how they might use the competition activities in their program back at their home college, five responded by saying:

- I will be setting group competitions among my students that are going to be similar to what I saw at Lone Star College.
- I have my students performing a shift change in two of the classes I teach. Also, the students have become leaders in their classes by helping other students troubleshoot plant equipment.
- Motivation for other students, great learning examples to share with all the other students who did not get to attend, advertising and talking up the program to others who might be interested in PTEC
- We hope to get access to the Simtronics scenarios for use by our students.
- I will definitely use materials that I have gotten to enrich my Troubleshooting classes.

When queried about how the competition could be improved, four responded with:

- Better training for the coaches and students on scoring.
- I think all the changes and additions made this year were great. I felt that every team had a fair shot at winning.
- Not sure, this years event was pretty special.
- Two items: 1.) The students were told to get the systems back to "within" 5%. What does that mean? 5% of set point? 5% of valve position? 2.) I am under the impression that the Simtronics

scoring tool calculates the area (+/-) under the trend curve that is not Set Point. If this is accurate, all competitions should have all teams stay for the entire duration of a scenario.

Lastly, they were asked to provide any additional information they could that may improve the competition next year.

- The organizers did a great job.
- They were great. Very well organized. Nice to see industry sponsors in attendance. This was my first experience, so I have nothing to judge by.
- This was the best competition ever!

As can be read in the comments above, generally the coaches had a good experience and reported their students had a good experience as well. They reported that the student's networking opportunities and interacting with peers was beneficial. They thought the competition was well organized and suggested that it be opened to more teams. A couple of comments seem to take issue with Simtronics and question whether familiarity with the software was the driving factor in the how teams performed.

### *Judges*

A survey was sent to the three judges. Two responded and were positive about the Competition. One respondent noted that the "Competition rooms were HOT! Need to ensure adequate temperature control of the computer rooms. Need to establish a waiting area for the coaches (away from the computer rooms) and restrict them to that area during the competition."

When asked about the additions to the Competition, the VFO, new process unit and the shift change, all were positively viewed by the judges. One comment regarding the VFO was "Great add to the competition. Need to have inside/outside operators in separate rooms (out of visual contact) and have them communicate via radio. Also need the competitors to follow procedure step by step...working together." Another comment about the shift change was "This was another great addition to the competition, but needs to be improved. A means of judging the quality of the shift turnover needs to be defined. Clear instructions should be given at the start of the exercise, and then no additional prompts (except for time). Need to have a means of identifying participants, to ensure turnover takes place. Some thought should be given to the roles of each person in the scenario."

Interestingly, both judges thought that there were not enough judges. The comments were,

- Four would have been better since the teams were divided in two separate rooms - if we separate the field operator from the console operator next year, may need additional judges - in this year's competition, the additional help from Simtronics and Systran was invaluable
- There were enough judges for the facility layout at Lone Star. May need to add an additional judge, especially for the VFO piece, if rooms will be physically separated (Note added by Flynn, the respondent may have intended to write "there were *not* enough judges... based on the context of the comment and indicating in the survey NO to the question of enough judges)

One judge opined that help was needed from Simtronics and Systran this year during the competition to monitor the system, help with timing, etc. Also, a visible, digital time clock that counted down the time would be helpful. For next year, other criteria that should be considered for the competitors included, "a team should be able to earn additional points for completing the exercise early - use the VFO on every exercise" and "need to consider how to address returning participants consider the addition of industry teams."

The strengths of the Competition were noted as, "real life scenarios – real life environment (control room/outside)" and "event was very well organized". One comment on how the Competition could be improved was "get the full endorsement and participation of NAPTA - start earlier with advertisement and marketing - have regional qualifying rounds (by time zones) with four teams in the finals." Lastly, when asked what could make the judge's job easier, one comment was provided: "need a written judge's packet that documents guidelines, FAQs, issues from past competitions, etc."

## Conclusion

Overall, it would seem that the Competition was very successful. Several anecdotal comments mentioned that this was the best Competition to date and the results of this report support this assertion. The addition of the VFO, new process unit and shift change were all good additions. Some coaches were observed taking pictures of the computer screens and paperwork before and during the Competition. The management team may want to address this and/or provide some guidelines. Also, teams bringing additional guests should also be addressed going forward. Additional guests should be welcomed as it will increase exposure for the competition but they should be expected to pay their own way. The students clearly benefitted from the Competition.

They seemed to greatly appreciate the networking opportunities. The coaches also saw several benefits for the students as well as ways to incorporate elements of the competition into their classes. The judges generally thought the Competition went well but both expressed the need for an additional judge.

The logistics of the Competition were all deemed adequate and wherever the Competition is held next year can copy the process and procedures from this year and be assured of a successful Competition.

Going forward, in order for future Qualifying and National Competitions, the management team will need to explore and develop several funding options since the grant is set to expire later this year. Options include seeking additional grants, seeking corporate sponsorships and general fundraising. Please know that if Innovative Educational Consultants, LLC can help in any way we would be glad to be of assistance.



## Process Troubleshooting Skills in Energy National Troubleshooting Competition

### SCHEDULE

#### **Friday, April 22**

2:30 PM	Meet in Hotel Lobby for Travel to Lone Star College Campus
3:00 – 5:30 PM	Team Registration, Student Conference Center
3:00 – 5:30 PM	Team Practice on Computer Simulator & Virtual Field Operator, Student Conference Center
<b>5:45 – 8:00 PM</b>	<b>Dinner and Networking at the Shell Industry Hour</b>
8:00 PM	Return to Hotel

#### **Saturday, April 23**

6:15 – 7:45 AM	Breakfast in Hotel Dining Room
8:00 AM	Meet in Hotel Lobby for Travel to Lone Star College Campus
<b>8:30 – 9:00 AM</b>	<b>Opening Remarks – Maribeth Stitt</b>
9:00 – 9:30 AM	Practice / Warm-up Session – Room ADM 206 & 208
9:30 – 9:50 AM	Q & A with Simtronics Support – Tim Judge
<b>10:00 – 10:45 AM</b>	<b>First Round of Competition</b>
10:45-10:55 Break	ADM 112
<b>11:00 – 11:45 AM</b>	<b>Second Round of Competition</b>
Noon – 1:15 PM	Lunch – Lone Star College, Student Conference Center
<b>1:30 – 2:45 PM</b>	<b>Third Round of Competition</b>
2:45-2:55	Break ADM 112



**3:00 – 3:45 PM**

**Fourth Round of Competition**

3:45 – 4:00 PM

Student Online Survey ADM 206 & 208

4:00 PM

Competitors Return to Hotel

6:00 PM

Meet in Hotel Lobby to Travel to Awards Banquet Ceremony

6:30 PM

Dinner and Awards Ceremony at Lone Star College Student  
Conference Center