

## Rogers High School Brings Heavy Equipment Operator Training to Toledo's Urban Students with Simlog's Affordable Personal Simulators

Rogers High School is located in Toledo, the fifth largest city in the state of Ohio, and is part of the Toledo Public Schools (TPS) school district. As a comprehensive high school serving grades 9 through 12, the school offers both college preparatory, and career and technical courses. Rogers High School is located in an urban area with a staff of just over 100 and a population of 1,140 students.

The Construction Careers Academy (CCA) opened its doors in 2004 as a small vocational school within Rogers High School. The CCA offers a rigorous four-year construction trades program designed to prepare urban students for local apprenticeship programs, as well as for post-secondary construction management programs.

Keith Dawson, who helped establish the CCA, is program coordinator and teaches the junior and senior classes (grades 11 and 12 respectively). He has been a licensed construction technology teacher for over 20 years.

To meet the high standards for the program's curriculum set by the school district and the Ohio Department of Education, Keith Dawson relies on several local industry partners who serve as mentors to the program, including the International Union of Operating Engineers (IUOE) Local 18 in Cygnet, Ohio.

### The Heavy Equipment Training Challenge

In 2009, the CCA added comprehensive heavy equipment operator training as part of its program. The drive to add hands-on operator training came from the CCA's mentor partners who were facing a growing shortage of skilled apprentice operators to work in heavy road construction.

"With massive stimulus spending on infrastructure in the state of Ohio, there emerged a sense of urgency to add hands-on operator training," explains Keith Dawson. "We wanted to get students interested in the trade but in a way that would be cost-efficient for our urban location with limited space."

### A Cost-Effective Solution

Keith Dawson looked to IUOE Local 18 to help shape the new operator training curriculum. It was there where he learned about the Ohio Operating Engineers long-time use of PC-based heavy equipment simulators supplied by Simlog. Local 18 owns fifteen Simlog Personal Simulators deployed at 4 training centers across the state for a variety of construction earth moving, cranes, and forestry equipment operator training.

With the support of the nearby IUOE Local 18 training center, Keith Dawson proceeded to work closely with Simlog to develop a proposal for funding the simulator purchase. The proposal was submitted to the school district's Career and Technical Education Director for Trades and Industry. An application was submitted for funding under the Perkins Grant, and within two months a purchase order was issued.

The CCA purchased two simulation software licenses; one for Simlog's Hydraulic Excavator Personal simulator and the other for Simlog's Mobile Crane Personal Simulator. A combination of Simlog's USB-ready OEM and Replica Controls was purchased with the industrial chair-base option.



Rogers High School's simulator stations equipped with OEM and Replica Controls.

"The OEM Controls provide the realism of original equipment excavator handles and the Replica Controls are equally industrial strength for mobile crane operator training," explains Dawson. "The simulation software and controls were very affordable even with the higher-end chair-base option."

Each simulation software license is installed on a separate desktop PC equipped with a large LCD display, all purchased by the school. Installation of the simulation software and setup of the simulator controls was done by one person from the school district's existing computer resources staff within a couple of hours.

To complement the simulator-based training with some real "seat time" for the students, the school also purchased a real skid steer loader. The one skid steer loader was purchased with a bucket attachment that allows it to function as a backhoe loader. The same skid steer loader also serves to provide students with some forklift operator training.

"But it's the simulators that have allowed us to really bring our operator training to life for our students," says Dawson.

### **Simulation at the Core of a Rigorous Curriculum**

Simulator-based training begins in the students' junior year (grade 11) and continues through their senior year (grade 12) to prepare them for seat time in the school's skid steer loader. Students receive equal time on both simulators, always working to attain the performance targets that are established as benchmarks for each quarter of the school year (approximately 10 weeks).

Each simulator has a built-in instructional design that is unique to the particular type of real equipment operation. Skills development is segmented into a series of modular tasks that become progressively more difficult. Students learn at their own pace with Keith Dawson supervising them only initially, and becoming less present as the students develop their skills and confidence.

"When students start off on the simulators in their junior year, I want to see the tasks become second nature for them," explains Keith Dawson. "I'll be supervising them more at the beginning and intervening as needed to help them develop their hand-eye coordination and muscle memory."

Keith Dawson relies on the comprehensive set of key performance indicators that are automatically measured by the simulators as the students work on each simulation module. This provides objective measures of the quality and productivity of the students' progress. Keith Dawson established his own benchmarks for each simulation module, trying to make sure that the targets are appropriate for high school students.

During their junior year, the students rotate between the hydraulic excavator and mobile crane simulators at thirty minute intervals for a total of 2 hours per week. The students are expected to attain basic benchmarks, and show improvement in a two week period. For example, on the hydraulic excavator simulator, bucket collisions must decrease by 30% in a two week period. The benchmarks are changed every 2 weeks as the students gain proficiency. By the end of their junior year, each student will have received about 40 hours of training per simulator for a total of 80 hours.

In their senior year, students use the simulators to prepare for seat time in the school's skid steer loader. Students work on both simulators for 1 hour per week for a total of 20 hours per simulator (40 hours combined simulator time) by the end of the year.

"For the seniors, I change the benchmarks every week and customize the level of difficulty according to the student," says Dawson. "Our goal is to bring the seniors within a 90% efficiency range with their benchmarks by the middle of the fourth quarter of their senior year before they start training in our skid steer loader."

Training on the school's skid steer loader takes place in a school parking lot where space is limited to only about 300 square feet. Three periods twice per week are dedicated to hands-on training which lasts for six to seven weeks. Keith Dawson tries to give each student about one hour of seat time per week for no more than six or seven hours of seat time per student in their senior year.

As part of the operator training curriculum, Keith Dawson works closely with IUOE Local 18's training center in Cygnet, Ohio to allow the students to observe and participate in hands-on activities that are aligned with the simulator-based portion of the curriculum. Students visit the IUOE Local 18 training center twice per year.

## Career Orientation Assessment

In the early part of the junior year, the simulators are used to determine if operating heavy equipment sparks an interest with any of the students. The simulators also provide an objective indicator of their operator potential.

A rubric score is used that takes into account Keith Dawson's observations about each student's skills development, along with the student's simulation results. The key performance indicators measured by the simulators reflect the competencies established by the state of Ohio for the rubric and are a part of Ohio's content standards.

The rubric uses a scale of 0 to 5 with a score of 3 or higher leading to a recommendation to consider a career as equipment operator. Otherwise, the student is encouraged to consider another field in the construction industry. Regardless of their score, all students continue simulator-based training.

## Training Benefits and Outcomes

The 2009 school year saw the first junior class of eight students taught under the new operator training curriculum using Simlog's heavy equipment simulators. All eight students continued on as seniors in 2010, and a new class of thirteen juniors began experiencing heavy equipment operations for the first time that same year.

"Having the simulators immediately captivates the students," explains Dawson. "Due to the liability of this occupation, the simulators allow us to start exposing our students to heavy equipment operations without the risk of injury to the students or to the equipment."

The school's total investment for the hydraulic excavator and mobile crane simulation software, simulator controls and chair-base units was just around \$20,000. The same simulation software can be set up with a significantly less expensive table-top mounting option using the same industrial strength simulator controls.

The two simulators enable Keith Dawson to not only prepare students for pursuing a career as hydraulic excavator or mobile crane operator, but also for many other types of heavy equipment where the skills are transferable. For example, the mobile crane simulator helps prepare students to operate an aerial lift, which they get to do at the Local 18 training center.

This helps the school make the most of its one skid steer loader and limited space for hands-on training. The alternative, acquiring or renting different types of heavy equipment, or transporting students out to donated equipment, would be cost and time prohibitive.

Minimizing wear-and-tear and damage to the school's sole skid steer loader has been another benefit to the program. By the time the students begin their seat time in the school's skid steer loader, each student has received 120 hours of simulator time. The risk of damage due to operator inexperience has largely been eliminated.



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Students who operate the skid steer loader first develop their core skills using Simlog's Personal Simulators.

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"The operating engineers appreciate the students being exposed to the simulators early because if a student still expresses an interest after graduation, they know it is a genuine interest in the trade," says Dawson. "Approximately 22% of the students who began operator training have at least shown an interest in pursuing an occupation as an operating engineer."

## Program Promotion

Keith Dawson frequently uses both simulators to give presentations at the local junior high schools to promote the CCA program.

"We have most of the middle schools and parents visit our program and they absolutely love the simulators," says Keith Dawson. "I even had a potential industry partner, an owner of an excavation company, come in and sample the simulators and he was amazed by the accuracy of the training."

## Looking to the Future

In the 2011 school year, enrollment is expected to be 24 students which is the current limit set for the program. Keith Dawson sees his program continuing to evolve by leveraging the partnership with IUOE Local 18 even further. This includes help from the local with enhancing the curriculum, and increasing the number of field trips to the Cygnet training site from two to five per year.



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Visits to IUOE Local 18's training center in Cygnet, OH, allow students to become familiar with real equipment in the field

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Keith Dawson would also like to add more Simlog simulators. The goal continues to be keeping students engaged and interested in pursuing a career in heavy equipment operations. Additional simulators ensure that students gain the foundation skills that will give them access to the greatest number of employment possibilities, regardless of the availability of funding for the program in the future.

"I have plans for Don Frantz, the training director from Local 18, to help refine our simulator benchmarks to make sure they are appropriate for high school students," says Dawson. "I also plan to add Simlog's Wheel Loader simulator to help prepare students for even more high demand equipment operator jobs in heavy road construction."

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