

## Southern Maine Community College Saves \$50,000 Per Year on Heavy Equipment Operator Training with Simlog's Personal Simulators

In the State of Maine and across the U.S., parents continue to under value the benefit of vocational training for their children. This is largely due to misconceptions about working in the trades, and that includes working in heavy equipment operations. Making the labor shortage more acute is the average age of typical heavy equipment operators, with many now nearing retirement.

The "Heavy Equipment Operator Certificate" ("HEOC") program at Southern Maine Community College (SMCC) was developed in 2007 to address the operator shortage faced by the construction industries in Southern Maine. In order to do so, SMCC had to overcome significant training challenges, including access to heavy equipment and lack of an appropriate space for hands-on training.

This success story outlines the creation of SMCC's HEOC program, including how the College worked with local industry partners and leveraged training simulators from Simlog to ensure the cost-effectiveness and sustainability of the program, even through the unexpected economic crisis that emerged in 2008.

### A Team Poised for Success

Seven years ago, Dr. Janet Sortor joined SMCC as Vice-President and Dean of Academic Affairs, recruited by the newly appointed President. Together, they worked to increase enrollment from 2000 to well over 6000 students. As a result, SMCC has become the largest educational institution in the State of Maine.

The HEOC program falls under the direction of Janet Sortor and the management of Richard Thomas, Chair of the Transportation Technology Department. The program instructor, Jeff Anderson, is at SMCC part-time, and works as an equipment operator and foreman for a local construction contractor.

### Partnering with Local Industrial Sponsors

Soon after arriving at SMCC, Dr. Sortor set out to revive a neglected Automotive Technology program by reaching out to local car dealerships. With their guidance and financial support, Richard Thomas



SMCC's South Portland campus sits on an 80-acre site overlooking the scenic Maine coast.

came on board to help create what has become one of the best Automotive Technology programs in the State of Maine.

The Automotive Technology program, revitalized by partnering with local car dealerships, served as a model to respond to local construction contractors looking for help with training heavy equipment operators. What became the HEOC program at SMCC was made possible by the financial and in-kind support of eight local contractors.

The primary sponsor and champion of the HEOC program is R. J. Grondin and Sons, a third generation, family owned earth moving business. Grondin is the largest such employer in Southern Maine, with about 150 employees. Larry Grondin, Aggregate Manager, serves as Chair of SMCC's HEOC Advisory Committee.

"Industry partners were critical to the development and implementation of the program, including funding to buy simulators," says Janet Sortor. "SMCC provides the classroom infrastructure and instructor under a College certified program that in turn supplies the local construction industries with new employees."

## Program Inception and the Hybrid Curricular Model

As a leading member of the regional construction association, Larry Grondin had come to hear about a new heavy equipment operator training program established at a high school level vocational training centre in Bangor, Maine with the help of a major contractor in that area.

That program, with simulator-based training at its core, served as a different kind of model of what could be done with (a) sufficient financial and in-kind support from industrial sponsors, and (b) sufficient willingness on the part of a local educational institution. This pre-existing program helped establish the parameters for what became the HEOC program at SMCC.

As part of their due diligence, the SMCC team also talked with the staff responsible for the heavy equipment operations program at a community college based in the northern part of the State of Maine. The program there relies exclusively on seat-time in real heavy equipment, with no simulator-based component. SMCC quickly ruled out the creation of a similar program.

Practically, SMCC lacked both the space on campus to work with real heavy equipment, and the necessary funds to purchase and maintain such equipment.

“By making simulator time a key part of our program, we can prepare students in the classroom with practical experience that transfers to machine operation in the field,” explains Janet Sortor. “We are making training safer and less costly by limiting machine time and wear-and-tear on the contractor’s equipment, not to mention the \$50,000 annual fuel costs experienced by other programs that do not utilize simulation.”

For all of these reasons, a hybrid approach to training that relies on simulators in the classroom, and looks to equipment on loan from industrial sponsors, proved to be a much simpler and less costly route to program creation.

## HEOC Program Overview

The HEOC program is a one year certificate program designed to produce operators trained on earth moving equipment such as dozers, backhoes, excavators, and graders. Graduates will be prepared to work in county, state, or interstate highway construction, agricultural construction, airport development, and commercial and residential construction.

“Students enrolling in the program must first complete OSHA and MSHA training, and must have a car driver’s license,” says Richard Thomas, Department Chair. “Drug testing is also imposed by the contractors in relation to the internship part of the program.”

In addition, all students must pass the SMCC standardized “Accuplacer” entrance exam, as do students applying to all other programs. Suitably qualified students then enter the program on a first-come, first-served basis.

Tuition at SMCC is similar for all programs with an average (including books) estimated to be USD \$1,500 to USD \$2,000. This represents about one-third of the true costs of the technical vocational training, with the remaining two-thirds coming from the State of Maine.

To date, few of the incoming students have been coming from the industrial sponsors. Most of them are from the State of Maine, but some are from out of state.



Richard Thomas, Department Chair, next to one of the seven excavator cabins donated by an industrial sponsor to house Simlog’s Personal Simulators in SMCC’s simulator lab.

## HEOC Program Curriculum

SMCC’s Hybrid Curricular Model incorporates traditional classroom based instruction, competency based simulated operator training, gravel pit based hands-on skill development with equipment, and a hands-on internship in the field.

Currently, the HEOC program is comprised of the following courses:

- Electricity and Electronics
- English Composition
- Introduction to Construction Safety
- Maintenance and Service
- Backhoe and Excavator Simulation Lab
- Principles of Site Finishing and Grades
- College Algebra and Trigonometry
- Introduction to Welding
- Heavy Equipment Operations Internship

### Backhoe and Excavator Simulation Lab

SMCC's simulator lab is composed of 7 Hydraulic Excavator Personal Simulators purchased from Simlog Inc., the developer of the simulation software. Each simulator station is equipped as follows:

- One desktop PC
- Two original equipment (OEM) joysticks mounted to an office chair
- A real excavator cab donated by a local heavy equipment dealer
- An LCD display mounted on the inside of the cab

The 7 desktop PCs are networked together and linked to a common database, called Simlog's Simulation Manager, which controls all user login accounts and automatically keeps track of students' simulation results.



A closer look at Simlog's Hydraulic Excavator Personal Simulator with Original Equipment (OEM) joysticks mounted to an office chair inside a real excavator cab.

### Operator Training in Five Steps

Including the time students spend in the simulator lab, the actual backhoe and excavator operator training part of the program is carried out in 5 steps:

#### Step 1: Operator Safety

The 1st semester begins in early September with an 18-hour course in which students acquire the knowledge to safely work on a heavy equipment construction site. For example, how to perform a pre-start safety inspection, as well as how to properly start up and shut down the equipment.

#### Step 2: Equipment Familiarization

The 1st semester continues with 60 hours of classroom time combined with time in a local gravel pit provided by the primary industrial sponsor, R.J. Grondin, in the nearby town of Buxton. Students become familiar with various types of equipment, but at this stage they do not operate the equipment. Students work just day shifts in the gravel pit.

This step corresponds to the National Center for Construction Education and Research (NCCER) "Level 1" training.

#### Step 3: Training in the Simulator Lab

The 1st semester ends with 90 hours in the simulator lab. Students train on the simulators by working through 10 of the 12 built-in Simulation Modules, with each Simulation Module progressively increasing in level of difficulty over the last. This is core to the simulation software's Instructional Design.

Benchmarks were established for all 10 Simulation Modules by the instructor, along with a grading system (A+, A, A-, etc.) based on the relative numbers from the Key Performance Indicators associated with the quality of the students' work.

"Rather than incorporating benchmarks for execution time or productivity, which is also measured by the simulators, we use a single test for grading productivity," explains Richard Thomas. "During a single class period of 2 hours and 45 minutes, students work through the 10 Simulation Modules and anything less than C is a failing grade."

After so many hours in the simulator lab, most students obtain a grade of A.

#### Step 4: Training at the Controls of Real Equipment

Once students are sufficiently prepared in the simulator lab, they return to the same gravel pit as Step 2 for 90 hours of seat-time at the controls of 2 or 3 pieces of equipment, typically wheel loader, bulldozer and excavator, for no more than 30 hours in each one. As before, students work just day shifts, and this brings the 2nd semester to a close at the end of May.

This step corresponds to the NCCER "Level 2" training.

#### Step 5: Internship

Students complete the program by spending the month of June as interns with the industrial sponsors, to be introduced to work conditions in a real world context.

The number of possible internships serves to limit enrolment in the program. In other words, in order to take on more students, SMCC would need to add a corresponding number of new internships.

During the internship, each student submits a weekly report to SMCC about their activities to help SMCC supervise the work assigned to the students. After 2 weeks, the industrial sponsors submit preliminary student evaluations to SMCC. The final evaluations are submitted 2 weeks after the internship ends, and counts for 75% of the student's grade.

<b>Backhoe and Excavator Operator Training</b>		
<b>Step</b>	<b>Location</b>	<b>Duration</b>
1. Operator Safety	Classroom	18 Hours
2. Equipment Familiarization	Classroom and Gravel Pit	60 Hours
3. Simulator Lab	Classroom	90 Hours
4. Hands-On Operation	Gravel Pit	90 Hours
5. Internship	Industrial Sponsor	1 Month

## HEOC Program Promotion

Aware of the misconceptions among young people about working in the trades, and the challenges this poses to recruiting students, SMCC also uses the same heavy equipment simulators purchased for operator training to help promote the HEOC program, and vocational training in general, especially at the local high schools.

## HEOC Program Success to Date

SMCC's HEOC program began in September 2007, with the 1st group of 7 students graduating in June 2008. The 2nd group of students started in September 2008 and 6 graduated in June 2009. The 3rd group started in September 2009, with 7 students.

"With an initial investment of around \$40,000 for the simulation software and controls, we can give 7 students a total of 630 hours of simulator time per year, accounting for half of their practical training," says Janet Sortor. "With HEOC now in its 3rd year, the simulators have already paid for themselves almost twice over on just fuel savings alone, and not counting less wear-and-tear on our sponsor's equipment."

Most graduates have gone on to work in the construction industry, with some joining R.J. Grondin, the program's primary industrial sponsor, as laborers pre-trained to be equipment operators.

## Looking to the Future

In 2010, the newly-closed Brunswick Naval Air Station near Portland will become a satellite campus of SMCC. As a result, a certain number of programs will be moved from the existing SMCC campus in South Portland. It is expected that Heavy Equipment Operations will be included in the move, along with a complementary new program in heavy equipment maintenance.

"With new facilities on the horizon, it will become possible to create a two year Associate program by increasing the scope of the current program," says Richard Thomas. "New subjects might include simple soil analysis, wetlands development, and environmental hazards."

It is also hoped that by then, new simulation software from Simlog to train bulldozer and motor grader operators will be available to establish a "Bulldozer and Grader Simulation Lab".

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