



SOCIETY OF ACTUARIES

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TECHNOLOGY ENHANCED LEARNING IN ACTUARIAL SCIENCE CLASSES

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EACH YEAR, the Society of Actuaries sponsors an education and research grant competition for universities that have attained the Centers of Actuarial Excellence (CAE) designation. Not only do the grants serve as a benefit for CAE schools, the grants are a way for the SOA to work with these schools to further the development of actuarial research and intellectual capital.

Grants are sizable, with amounts of up to \$100,000 per year for up to five years. Since 2010, the SOA has awarded grants to:

- Georgia State University (research), 2010
- University of Wisconsin–Madison (education), 2010
- University of Iowa (research), 2011
- University of Waterloo (research), 2011
- Temple University (research), 2012
- University of Michigan (education), 2012

For 2013, grant recipients will not be announced until contracts are in place.

Several of the grants are coming to completion, including the University of Wisconsin–Madison’s education grant to develop online study resources for actuarial students. These tools are publicly available on the SOA website and can aid candidates’ preparation for exams P, FM, MFE, MLC and C.

The following article discusses the evolution of the online materials developed by Wisconsin and how they can be used to support actuarial education. Look for more information on other CAE grants in future issues of *The Actuary*. —**Ronora Stryker**

In 2010, the University of Wisconsin–Madison was awarded the first education grant from the Society of Actuaries’ Centers of Actuarial Excellence program. The purpose of our proposal was to develop

technology enhanced learning (TEL) tools that would be distributed publicly to supplement the actuarial education classroom experience.

We are nearing the end of the three-year grant period and this article summarizes what we learned, the materials we produced and where we might venture in the future. The materials can be found at www.soa.org/PracticeQuestionVideos.aspx.

Everyone has a different learning style. As mentioned by John Mange and Sherri Blyth in their “Technology’s Role in Actuarial Education” article in the December 2012/January 2013 edition of *The Actuary*, some of us learn best by reading and others by listening. Our approach was to create videos using the software Camtasia that combines both elements.

Over the three-year grant period, we focused on creating videos to help students understand the solutions to exam problems. The exam problems are those sample problems posted online by the Society of Actuaries and Casualty Actuarial Society. In addition to the video, we include our written solution and a CAS/SOA posted written solution. In this way, students can see alternate ways to solve a given problem.

CAE Program

READ MORE about the Centers of Actuarial Excellence Program—an overview, benefits, announcements and a listing of the current CAE schools. Visit the SOA website. Go to Education, University/College Resources and click on CAE home page for information.



We started with course P, as many of our students have difficulty with the material. More than 140 course P videos have been created. There are also videos for preliminary exams FM, MFE, MLC and C.

The videos use a similar format with an introduction slide of the problem number and the learning objective, presentation of the problem, a pause to allow the students to try the problem on their own, the video solution and a summary slide. Almost all videos include closed captioning.

Closed captioning provided an interesting addition, as the student could view the video, hear the explanation and also read what was being said. That triple reinforcement of the presentation of the solution helps accommodate multiple learning styles.

The videos were developed by our undergraduate students at UW–Madison. They gained many skills, including the art of teaching. As we gained experience, we developed a more intricate approach with a template for solving the given problem, expanding more in the solution to provide instruction. The goal was not always solving the problem in the quickest way. The student presenter discussed the strategy of solving the problem, and while going through the solution, would highlight important concepts, with perhaps more explanation. Thus, the student became aware of being a more effective communicator of technical concepts. Videos were critiqued by the group of students working on the project in that semester, building in a level of quality control. Over the three-year grant period, we employed 57 unique students. Some students worked over multiple semesters. We employed 96 students during the fall, spring and summer semesters, with

an average of just over 10 each period. Faculties were involved to supervise the students.

The teaching, communication and software skills learned by the students will be invaluable when they continue on in their professional life. Students knowing how to create these videos could document these processes in a way that is clear when transferring responsibilities from person to person.

Videos are helpful for specific questions when a student is stuck and unable to solve the problem. As a supplement to these, flash cards were created to help students learn notation for exams FM and MLC. These flash cards contain the symbol, with its definition, as well as quizzes that provide the word and then ask the student to provide the symbol. In addition, the flash cards test relationships between quantities like annuity-immediate and annuity-due.

As a department heavily invested in applied statistics, there has been a substantial amount of material developed to aid in the education for regression analysis. The regression class is difficult for students as it is more unstructured and is a much more hands-on course than classes for the material found on the preliminary exams. This regression course builds on the basic statistics course, adds learning of statistical software and then finally adds the piece: regression. One overall purpose of the course is for students to be able to complete a project using regression techniques.

As such, we have created tutorials to aid in the learning process. There are tutorials about learning the statistical software package R, tutorials using Excel and interactive tutorials developed to increase student active participation on the software code.

Although an education grant, we developed a research attitude and experimented with many learning tools. As a product of this experimentation, interested viewers will find interactive lecture notes on the second half of Actuarial Mathematics and presentations of a series of lectures on copula regression, a topic our doctoral students study.

At the end of the three-year period, we have developed a strong approach to TEL that provides quality materials and also extensively involved our current students in both the learning and the development processes. We are planning on extensively integrating this material, developing other material for use in our classes and making some of the material public. The technology to produce the material is changing rapidly. In fact, since we wrote the grant proposal, the amount of massive open online courses (MOOCs) has exploded. These courses illustrate wide variety in educational topics using rapidly changing technology. As educators, we want to adapt our materials to the technology and to the learning styles of the generation of actuaries we see in our classes. ▣

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