Abstract

This panel will discuss how educational institutions will meet the high worldwide demand for software engineers. Software engineering education trends in the United States, Europe, China, and India will be discussed by the panelists.

1. Background

Software education emerged during the last 50 years of the 20th century. During the mid-1900’s, computers were applied to create firing tables for the military. Scientists programmed these computers using computational algorithms. Computer memories were small and expensive and successful software depended on efficient algorithms. As computer use grew, universities began to offer programming courses based on algorithm methodology. The application of mathematical science of algorithms to computers lead to a new field called computer science. As demand for computer programmers grew, computer science programs at US universities grew in number. US universities had the computers while universities outside the US and Europe did not have access to computers. As the size and complexity of computer systems continued to grow, one could not rely on the theory of algorithms to provide acceptable solutions. At a 1968 NATO conference in Europe, computer professionals realized that the software for major systems would have to be engineered based on engineering science and practice. That is when the term software engineering was introduced. In 1984 the US Department of Defense created a Software Engineering Institute at Carnegie Mellon University to advance the practice of software engineering.

Throughout the 1990’s, the cost of computers continued to decline and the capabilities of computers increased. Computer cost was no longer a barrier to the spread of computer related education programs to universities throughout the world. This has been aided by the creation and expansion of the World Wide Web over the Internet.

By the end of the 20th century, computer science degree programs were offered by most of the major universities. Demand for programmers exceeded supply through the 1990’s. Demand for US based programmers peaked at the end of the 1990’s with what was called the year 2000 problem. Companies had to re-program legacy software systems by the year 2000 to assure that all systems could represent a year with four digits instead of the two digit representations often used previously. Legacy software systems were sent off-shore from the US to countries like India to have them re-programmed. The quality with few exceptions of the software produced off-shore was excellent. Today most if not all of the largest 1,000 US companies use off-shore software contractors.

2. Beginning of the New Millennium

Computer related educational programs at the beginning of the 21st century fall under the umbrella term of information technology which includes computer science, computer engineering, information management, and software engineering. Overall, the demand for information technology knowledge workers world wide is increasing. The US information technology education programs hit hardest by use of off-shore contractors are the science based computer science programs. Enrollment in US computer science programs is on the decline. These programs emphasize the middle or coding process of the Development Software Life Cycle (DSLC). The coding process is the easiest to outsource from high labor cost regions to off-shore regions where labor cost less. All indications are that the computer science down trend will continue. Demand for computer engineering graduates remains strong. The fastest growing demand is for information management and software engineering graduates. Software Engineering and Information Management programs teach students about all phases of the DSLC. The US Department of Labor projects software engineers to be one of the fastest growing occupations through at least 2014. Major universities...
are beginning to offer software engineering certificates, bachelor degrees, and master degrees.

At the beginning of the new millennium, the outlook for software engineers is strong. Distance learning technology is becoming common. Software development is being practiced with project members distributed around the globe. Open standards and interoperable software is being demanded by customers. Software knowledge will continue to change and expand. Panelists will discuss the evolution of Software Engineering Education in the New Millennium from the viewpoints of the United States, Europe, China, and India.

3.0 Panelists

Professor Bhavani Thuraisingham  
*University of Texas at Dallas USA*

Professor Barrie Thompson  
*University of Sunderland, UK*

Professor Carl K. Chang  
*Iowa State University, USA*

Professor Krishna Kavi  
*University of North Texas, USA*