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INTERVIEW

Nicholas Massa, Ph.D., is chairman of the Optics and Photonics Technology Department at Springfield Technical Community College (STCC) in Massachusetts. He has been an educator in the engineering, optics, and photonics fields for more than 30 years, with expertise in optics, laser electro-optics technology, and educational assessment and evaluation.

Massa is involved with plans to establish a Photonics Education and Practice Factory at STCC, in partnership with MIT's AIM Photonics Academy. The proposed state-of-the-art facility will ultimately educate the next generation of technicians for the integrated photonics manufacturing industry. He also has served as a principal investigator for National Science Foundation grants, including the PBL Project: Skills for the 21st Century.

Massa shares with Photonics Media his insight about the present optics and photonics education landscape, its direction and development, and what he anticipates for the future.

Q: As an educator, how do you view the current state of college optics and photonics programs?

A: According to the SPIE/OSA Optics and Photonics Education Directory, there are [as of 2018] over two dozen colleges and universities in the U.S. offering Bachelor of Science degrees in optics and photonics or related fields, but only 10 institutions offer associate degrees. In fact, there is only one institution in New England offering an Associate of Science degree in optics and photonics — Springfield Technical Community College — for a six-state region that is exploding with job opportunities. Even when combined, the 10 programs across the U.S. do not graduate nearly enough associate degree optics and photonics technicians needed to satisfy the growing needs of industry. The lack of skilled optics and photonics technicians in many cases is actually hampering the growth of many companies. As a result, many associate degree students are hired as early as their first semester of college on a part-time and/or internship basis in order to entice them to stay on full time upon graduation. Starting salaries typically range from $40,000 to $60,000 or more, with many graduates receiving multiple job offers.

One of the challenges facing associate degree programs, however, is the high cost of equipment needed to implement curricula and provide students with real-world, hands-on experiences. The cost of optical components, electronic instrumentation, lasers, fiber optic splicing and termination equipment, and metrology equipment for a well-equipped laboratory can easily range from $500,000 to over $1 million. As a result, most institutions have difficulty justifying the expense of building and sustaining viable programs for an academic discipline that produces only a limited number of graduates per year. Without substantial state and/or federal grant funding and industry support, most programs struggle to survive.

Another challenge is the lack of knowledge about the optics and photonics fields in general. Most high school students, teachers, guidance counselors, and parents have limited or no knowledge of the tremendous career opportunities available in the optics and photonics fields.

Others may have the false perception that the optics and photonics fields are beyond their reach, requiring a high level of mathematical ability (e.g., calculus and beyond). At the technician level, this is simply not the case. Most technician programs require only basic understanding of algebra and trigonometry to be successful.

This lack of awareness of optics and photonics is in large part responsible for typically low enrollment and community colleges' reluctance to fund such programs.

Q: What can be done to attract more students to optics fields and drive them into the workforce?

A: In my opinion, what is needed to attract and drive more students into the field is a concerted effort among industry, higher education, and government to increase awareness of career opportunities in optics and photonics, especially at the technician level, by marketing and advertising through both traditional and social media venues. The notion that optics and photonics are reserved only for those with a high level of mathematical proficiency must be dispelled.

In my 30+ years of experience, the best optics and photonics technicians have been those individuals with intellectual curiosity, strong problem-solving skills and mechanical aptitude, and an eagerness to learn. We can teach the rest. Not surprisingly, these are also the most important and sought-after workplace skills identified by employers.

Q: What will be key to ensuring the future success of college optics training programs and, ultimately, the workforce?

A: I believe the key to ensuring the future success of college optics and training programs is dramatically increasing enrollment in these programs. It's simple economics. In order for colleges to justify the high cost of implementing and maintaining these programs, there needs to be sufficient enrollment to offset the cost of developing and maintaining laboratories and hiring trained instructors.

To this end, I believe that higher enrollment is directly linked to increasing public awareness through marketing and advertising of the tremendous career opportunities available in optics and photonics. Early integration of optics and photonics principles and applications into middle school and high school curricula is also essential. In my associate degree program at STCC, I currently have about 30 students enrolled. I could easily handle twice that number and place every one in great jobs upon graduation.