

Evaluation Report of LASER-TEC

The Regional Center for Lasers and Fiber Optics

September 2013 through May 2014

Prepared by

Lewis Temares, Ph.D.

VP/CIO Emeritus, Information Technology

Dean Emeritus, College of Engineering

University of Miami

PART I

Introduction

LASER-TEC is a National Science Foundation Advanced Technological Education Center of Excellence in Lasers and Fiber Optics. It is an association of community and state colleges, universities, high schools and technical centers, trade associations, and laser and fiber optic (LFO) companies in the following eight southeast states: Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Florida. LASER-TEC started its operation in September 2013 based at Indian River State College in Florida, with the following principal partners: Central Carolina Community College - NC, Tri County Technical College – SC, and Valencia College – FL.

This report focuses on the performance of LASER-TEC from September 2013 to May 2014, the first out of a four year grant as a Regional Center.

The mission of LASER-TEC is to develop a sustainable pipeline of qualified laser and fiber optic technicians to meet industry needs in the Southeastern United States. To accomplish this mission the following goals were set:

1. Assist colleges with existing LFO programs by providing support, professional development, and equipment.
2. Assist colleges without LFO programs to create courses and programs by providing startup support.
3. Provide professional development for K-12 STEM teachers to bring LFO career awareness to students to create a high-school-to-college student pipeline.
4. Create awareness of LFO careers and a clear pathway for returning veterans to recruit them for participating regional college programs.
5. Develop, expand, and strengthen partnerships between LFO industries and all regional colleges.
6. Expand the membership of the Industrial Advisory Board (IAB), and monitor the supply, demand, and skill-set needed by LFO technicians in the Southeast region through a strong Industrial Advisory Board.

This report evaluates the progress, accomplishments, and challenges in achieving these goals.

In Part II of this report, we describe the evaluation model and methodology used for this project. We started working with LASER-TEC during the proposal development period and created the evaluation plan which we currently execute. Continuous formative evaluations have been done during the first year of operation. This report represents the summative evaluation of year-1 of this Regional Center.

In Part III, we use the Kirkpatrick and Kirkpatrick evaluation model, with its four assessment levels. The Kirkpatrick and Kirkpatrick model measures the success of the learning process that occurs during faculty professional development, student workshops, or any other training setting.

In Part IV of this report, we make recommendations to LASER-TEC for the second year of this project.

In Part V, we present our conclusions for this evaluation.

Part II

Evaluation Methodology

A mixed evaluation methodology was used to evaluate and analyze the goals and objectives of this project. The following four questions were asked to facilitate the evaluation process:

- What was proposed to be done?
- How was it planned?
- Is it being done as planned?
- Is the program successful?

Additionally, for goal number five, which has to do with training, the four level Kirkpatrick and Kirkpatrick method was used which asks the following questions:

- To what degree are K-12 teachers, counselors and administrators satisfied with the content and quality of LFO seminars and the center services? **(Reaction Level)**
- To what degree did K-12 teachers, counselors and administrators understand the need to incorporate LFO modules in life sciences classes and career counseling? **(Learning Level)**
- To what degree are K-12 teachers, counselors and administrators incorporating LFO modules in life sciences classes, and career counseling? **(Behavior Level)**
- How many new LFO courses, modules, lessons, and career guidance sessions have been added in K-12 schools, and how many students have attended? **(Results Level)**

The PI met with the evaluator on three occasions and outlined the goals, objectives and tasks of this project. An evaluation plan was drafted that include the collection of data for a continuous formative evaluation during each year of the project, and a summative evaluation at the end of every year of the project. Feedback from the formative evaluations was provided to the management team on a regular basis so that corrective actions are taken immediately for effective management. The evaluator was responsible for creating the evaluation instruments, scripts for telephone interviews, and other evaluation tools. The Center staff disseminated and collected the evaluation results from participants and delivers them to the evaluator for analysis and report preparation.

This report represents the formal summative evaluation for the first year of operation of LASER-TEC. It analyzes and assesses the progress of the project and suggests changes or realignment of goals and objectives for the following year as needed.

PART III

Evaluation Questions and Activities

What was proposed to be done?

1. Establish training programs and strategies, priorities and timelines to satisfy the laser and fiber optic education needs of the southeast region.
2. Assist partner colleges in creating specialized LFO training programs for the needs of their local industry.
3. Expand the coalition of partner colleges with LFO training programs to meet industry needs.
4. Enlist faculty and industry representatives to provide advice and direction for the Center's activities.
5. Create an outreach education program for middle and high school science teachers, counselors and administrators.
6. Recruit and assist returning veterans and minorities to enter LFO programs in the southeast US.

How was it planned?

Goal 1. Establish training programs and strategies, priorities and timelines to satisfy the laser and fiber optic education needs of the southeast region.

Objective A: Survey the training needs of the LFO industry and the preferred time for delivery.

Deliverables: i. Create time lines for delivering the training to the different industrial partners.
ii. Obtain commitment from employers to the training content and schedule.

Objective B: Study the best and most effective delivery method for training. Consider face-to-face, online, or blending of the two methods.

Deliverables: i. Catalog the preferred training delivery method by every stakeholder.

Objective C: Identify colleges with existing LFO programs and expertise in the geographical area where the need is.

Deliverables: i. Conduct a survey of LFO employers and find out what their special training needs are.
ii. Conduct a survey to identify colleges with existing LFO training programs.
iii. Produce a gap analysis identifying where new programs need to be created to satisfy industry needs.

Objective D: Conduct LFO information sessions at colleges identified in objective A located close to LFO employers.

Deliverables: i. Create an information seminar for identified colleges.
ii. Present the information seminar to the college stakeholders: instructors, department chairs, deans, and vice presidents.
iii. Follow up and assist in implementation of course or program.

Objective E: Prioritize delivery of the needed training based on the industry specific needs.

- Deliverables: i. Conduct a survey of LFO employers and find out what their timeline for the special training need is.
ii. Assist colleges with existing LFO training programs and local to the employers in delivering the training.

Objective F: Provide training to the college faculty closest to the industrial employer with the need.

- Deliverables: i. Conduct a survey to find if proximal to employers colleges have a need for professional development for their LFO instructors.
ii. Provide this training with the OP-TEC open-entry open-exit hybrid courses, or with Corning's Fiber IQ program.

Goal 2. Assist partner colleges in creating specialized LFO training programs for the needs of their local industry.

Objective A: Assist each college to create a quality training program that can be standardized and duplicated at any other partner college when needed.

- Deliverables: i. Training program in a LFO specialty area.

Objective B: Create bill of materials, equipment and part vendor list.

- Deliverables: i. Bill of materials needed for the LFO specialty course.
ii. List of vendors of materials and equipment needed.

Objective C: Deliver training to industry.

- Deliverables: i. End of semester report on training delivered to industry.

Goal 3. Expand the coalition of partner colleges with LFO training programs to meet industry needs.

Objective A: Create a campaign to inform all community colleges of the SE region about the Center and its purpose and invite them to join the center.

- Deliverables: i. Create lists of community and technical colleges of the SE region and targeted contact persons.
ii. Create information flyers announcing the creation of the regional center.
iii. Send flyers out via email and regular US mail.
iv. Follow up with phone calls.

Objective B: Offer information sessions at existing partner colleges and invite new colleges to attend.

- Deliverables: i. Design a model information session, including all the print materials, giveaway photonics kits, and lab tours for all partner colleges.
ii. Offer information sessions.
iii. Follow up with phone calls and surveys.

Objective C: Make presentations at regional and national conferences attended by colleges of the SE region.

- Deliverables: i. Present at HI-TEC conference.
ii. Present at PI conference.
iii. Present at state technology conferences, forums, or similar events.

Objective D: Create a campaign to employers of the region and ask them to encourage the colleges close to them to start LFO courses or programs with the assistance of the SE LFO Center.

- Deliverables:**
- i. Identify employers needing LFO training and located close to a community and technical college that has no LFO courses or programs.
 - ii. Contact employers and introduce the centers and its services to them.
 - iii. Ask employers to contact the colleges close to them and encourage them to start an LFO course or program.
 - iv. Follow up with employers and assist them in this process.

Objective E: Assist interested colleges with information on funding sources and grant writing.

- Deliverables:**
- i. Provide a list of funding sources for LFO programs.
 - ii. Create and deliver a grant writing workshop to interested colleges.

Goal 4. Enlist faculty and industry representatives to provide advice and direction for the Center's activities.

Objective A: Identify one faculty member and one IAB member from each partner college to serve on the regional center's steering committee.

- Deliverables:**
- i. Form the center's steering committee.

Objective B: Create a vision for the future of the Regional Center.

- Deliverables:**
- i. The steering committee creates a vision statement for the regional center.

Objective C: Compose a prioritized list of the annual goals of the Regional Center.

- Deliverables:**
- i. Create a list of the annual goals of the regional center.
 - ii. Prioritize the list of annual goals.

Objective D: Distribute the tasks for achieving the above goals to the member colleges

- Deliverables:**
- i. Assign tasks for achieving goals to member colleges.
 - ii. Create a timeline for completing assigned tasks.
 - iii. Create a reporting schedule for assigned tasks.

Goal 5. Create an outreach education program for middle and high school science teachers, counselors and administrators.

Objective A: Create a one-day LFO seminar for educating middle and high school educators, counselors and administrators.

- Deliverables:**
- i. Create the educational materials for the one-day LFO seminar.
 - ii. Purchase the LFO giveaway kits.
 - iii. Create agenda and promotional materials for the LFO seminar.
 - iv. Create promotional materials for attendees to take back to their schools to distribute to students.
 - v. Create a section of the center's website for K-12 personnel and students.

Objective B: Organize and offer the seminar once in the fall and once in the spring semesters.

- Deliverables:**
- i. Create address lists of middle and high schools of each college's service area.
 - ii. Create a contact list consisting of principals, vice principals, deans, science teachers, and counselors of each school.

iii. Invite people on the contact list to attend an LFO seminar which includes a stipend.

Objective C: Create a newsletter to keep in touch with seminar attendees, and update them with LFO news, statistics, and why they should be encouraging students to study LFO.

Deliverables: i. Create a semester LFO e-newsletter keeping the one-day seminar attendees updated on related events and developments.
ii. Send out occasional surveys to previous participants to keep them engaged and remind them of the regional center and its services.

Objective D: Inform attendees of online training, webinars and other free LFO training to seminar attendees over the school year.

Deliverables: i. Send information to participants about upcoming free industrial seminars, shows, webinars etc.
ii. Organize industrial seminars or technical presentations at partner colleges and invite one-day seminar participants to attend.

Goal 6. Recruit and assist returning veterans and minorities to enter LFO programs in the southeast US.
--

Objective A: Create paper and electronic LFO educational materials addressed specifically to returning veterans and minorities.

Deliverables: i. Create a paper and web-based flyer for returning veterans.
ii. Create a paper and web-based flyer for women and minorities.

Objective B: Locate the veterans transition, from military to civilian life, centers and make arrangements to either visit or send information packets about LFO educational opportunities.

Deliverables: i. Make a list of locations where the veterans transition program is offered.
ii. Contact and visit these locations and present the LFO options to veterans.

Objective C: Locate the transition centers for veterans with military LFO experience and inform them about possible award of college credit and accelerated degree completion.

Deliverables: i. Make a list of the locations where veterans with LFO training are discharged.
ii. Contact these locations and offer information about transferring credits into LFO programs of the southeast region.

Objective D: Create a veterans newsletter and email it to every veterans office of every partner college and also to any veterans offices in the vicinity of the partner college.

Deliverables: i. Create an electronic newsletter specifically for veterans.
ii. Send via email the newsletter to veterans offices of partner colleges and veterans offices in the service area of participating colleges.

Objective E: Work with the minority/diversity office of each college to create initiatives for increasing enrollment of minority groups in LFO programs.

Deliverables: i. Create an electronic LFO flyer targeting females.
ii. Create an electronic LFO flyer targeting African Americans and Hispanics.
iii. Create a minority/diversity section on the center's website.
iv. Visit minority/diversity offices on college campuses, explain the LFO program and deliver flyers.

Objective F: Ensure that all print and electronic promotional material depicts diverse minority role models.

- Deliverables:
- i. All pictures with students in promotional materials should have 50% women according to IWITS recommendations.
 - ii. All pictures with students in promotional materials should have representatives of all the major races: White, Black, Hispanic, Asian, etc.
 - Was the program successful?

Is it being done as planned?

Goal 1. Establish training programs and strategies, priorities and timelines to satisfy the laser and fiber optic education needs of the southeast region.

Action Plan and Timeline for Regional Center for Lasers and Fiber Optics

Legend: FL= fall, SP= spring, SM=summer, RC=Regional Center, PC=Partner College

ACTION ITEMS	TASKS	YEAR 1	YEAR 2	YEAR 3	YEAR 4
1. Organize the leadership team of the Regional Center and assign responsibilities to every member (Goals 1 and 4)	1A. All principal partners meet to identify work to-be-done, establish work priorities, and assign tasks to partners.	FL	FL	FL	FL
	1B. Publicize the formation of the center and its goals to educational institutions and industry.	FL SP SM	FL SP SM	FL SP SM	FL SP SM
	1C. Create a website for the RC.	FL			
2. Identify the specific area of focus of each principal partner college. (Goals 2 and 4)	2A. Each PC surveys its local employers to find out their special LFO training needs.	FL		FL	
	2B. PCs establish a training program to satisfy these needs.	FL		FL	
	2C. PCs purchase needed equipment and materials.	FL SP		FL SP	
	2D. PCs send instructor for professional development if needed.	FL SP		FL SP	
3. Expand the coalition of	3A. RC identifies colleges located near photonics	FL SP	FL SP	FL SP	FL SP

partner colleges and create new LFO programs. (Goal 3)	employers that need photonics training.	SM	SM	SM	SM
	3B. RC contacts these colleges and offers resources and support in creating photonics programs.	FL SP SM	FL SP SM	FL SP SM	FL SP SM
4. Create an outreach program for middle and high school science educators, counselors, and administrators. (Goal 5)	4A. Create a one-day LFO seminar for middle and high school educators, counselors, and administrators.	FL			
	4B. Each PC offers this seminar once in the fall and once in the spring.	FL SP	FL SP	FL SP	FL SP
5. Recruit and assist returning veterans. (Goal 6)	6A. RC investigates from where to recruit returning veterans.	FL			
	6B. Create paper and electronic materials introducing to veterans the LFO educational opportunities at PCs.	FL			
	6C. RC designs and executes a veteran information and recruitment campaign.	FL SP SM	FL SP SM	FL SP SM	FL SP SM

Because of delays caused by the federal sequestration the Center started its operation in January 2014. Nevertheless, it was able to accomplish all of its objectives during its period of operation.

Goal 2. Assist partner colleges in creating specialized LFO training programs for the needs of their local industry.

All three colleges accomplish this goal. IRSC established and secured equipment for their fiber-optic laboratory. They developed a fiber-optic course for both college and CEU credit. Professional development included two fiber-optic workshops for faculty and staff and they held and attended conferences with LFO educational components. By collaborating with industrial firms such as Corning Optical Systems, Fluke Networks, Jenoptik and Precision Contracting Services, Inc., (PCS) they were able to align their program with industrial need and work to sustain the employment pipeline for existing LFO programs. IRSC also worked to support and expand program enrollment by sponsoring 20 outreach events and 2 workshops for STEM teachers. In addition, they sought and received free outreach materials from corporate partners.

Valencia College began by identifying the workplace needs for Central Florida and then built the program capacity to meet the Orange County and Osceola District workforce demand with increase program enrollment. They

accomplished this goal through their strong partnership with Orange County Public Schools (OCPS). They're offering a dual enrollment Laser and Photonics magnet program at Wekiva High School where there are two teachers and a program advisor assigned full time. The teachers are given full access to the Valencia College courses and curriculum and the faculty and staff of VC and WHS meet regularly to discuss needs, LFO laboratory support and progress.

Central Carolina Community College (CCCC) supported this first goal in a number of ways. They engaged in the complete development of a Diode Laser Lab and an Argon-Ion Laser Lab along with providing assistance with the development of other labs. They recommended equipment to be used in the labs, establish lab procedures and develop lab manuals. CCCC surveyed the employees at Synoptics in Charlotte to determine their training needs. This resulted in the Human Resources department recommendation for Photonics training for some existing employees. They are currently working together to implement an on-line training program in conjunction with CCCC lab sites for 14 employees this year. In addition, CCCC provided support by volunteering time to develop curriculum and research the needs of local industries. Equipment and supplies are being provided with the solid state laser curriculum that is being worked on with industrial partners, MegaWatt Lasers and Synoptics.

Goal 3. Expand the coalition of partner colleges with LFO training programs to meet industry needs.

All three colleges succeeded in meeting this goal. IRSC developed partnerships with eight colleges in five Southeastern states. They developed databases of colleges that offer related programs in eight Southeastern states and e-mailed them to encourage expanding their college offerings in LFO and join the Laser-Tec Network. They also created a Laser-Tec website which included multiple LFO resources and developed and published guidelines on how to become a Laser-Tec college partner.

Valencia College's Career Pathway office is developing an articulation agreement with Wekiva's Electronics Technician Program to provide three college credits for the Introduction to Engineering Technology Course to students who successfully a jointly development assessment. It is estimated that 25 Wekiva freshman students will be enrolled in the Fall of 2015. In addition, faculty participated at the Fall meeting of the FORUM of Engineering Technology. FORUM is a consortium of members of the STEM representatives from Florida colleges.

CCCC assisted IRSC in the creation and submission of a HI-TEC 2015 Conference session proposal centered on the Laser-Tec mission and goals. They also began discussions with Wake Technical Community College to establish a pathway for Electronics Engineering Technology graduates to continue their education an additional year in order to dual major in Laser and Photonics Technology.

Goal 4. Enlist faculty and industry representatives to provide advice and direction for the Center's activities.

All three colleges met this goal. IRSC expanded and strengthened its partnerships with PCS, Corning Optical Systems, Anixter, ITS Fiber Business Services and Fluke Networks. They met and discussed fiber optics training opportunities, benchmarked training facilities, sought and identified equipment needed for the laboratories, hosted two free workshops with a total of 50 participants. Currently, Laser-Tec in partnership with Anixter is designing , planning and evaluating the content of a series of six hour long "Fiber Optics Fundamentals" courses. It is projected that this course will be piloted at IRSC and offered across the Southeast and will be tailored for specific LFO

industries. ITS Fiber offered a paid internship for five to seven IRSC students and President Cindy Boyd of PCS met with 40 IRSC EET students where she shared her company employment requirements and advised students on application processes.

VC faculty met with representatives from industry to discuss plans and strategies for meeting the objectives and goals of the project. L-3 Communications assisted with the teacher camps and is considering potential student internships as is Northrop Grumman Laser Systems. The Orlando Science Center (OSC) is assisting with the recruiting of STEM teachers for the camps, displaying program information and brochures at their visitors booth and on their website, offered to host the teacher camp activities and will provide internship opportunities for students.

CCCC met with Wasatch Photonics and discussed their employment requirements and requested his assistance with reviewing the spectroscopy focus of the new curriculum material. MegaWatt Lasers offered to donate a short pulse solid state laser system in coordination with Synoptics. Synoptics Human Resources is working with CCCC to identify potential candidates for two open laser technology positions. Duke University, Synoptics, MegaWatt and Wasatch all discussed employment opportunities for LFO program graduates.

During this reporting period the Laser-TEC Industrial Network was created consisting of companies that are employing laser or fiber optics technicians. Companies by SE region state that were contacted are as follows: Florida – 70, Alabama – 6, Georgia – 18, Kentucky – 3, Mississippi – 3, North Carolina – 23, South Carolina – 12, and Tennessee – 7.

A survey conducted to determine the most important knowledge and hands-on skills needed by optics/photonics technicians, and to assess company hiring plans. It was sent to 38 Florida companies. Results on the skills were useful and consistent with LASER-TEC focus. The companies responding currently employ a total of 61 optics/photonics technicians and plan to hire at least 22 more within the next 5 years. A similar survey is being prepared to send to companies in the 7 other SE region states.

<p>Goal 5. Create an outreach education program for middle and high school science teachers, counselors and administrators.</p>
--

All three colleges met this goal. IRSC hosted two hands-on six hour development workshops “Lasers & Fiber Optics” for school STEM educators with 20 participants. They have an additional one scheduled for June 12, 2014. In addition, they assisted in the establishment of the optics and photonics laboratory at the NorthPort Middle School by advising on tools and equipment procurement, helping with lab space design, aiding with the equipment installation and providing hands-on activities.

VC and the Orlando Science Center worked collaboratively in the development and delivery of a one-day camp in LFO which was conducted at the University of Central Florida. The VC team included two faculty and one staff who delivered the lessons and the hands-on activities. The participants included 85 students in grades 8 thru 12 and 10 teachers from several Orange County schools. VC worked with Wakiva High School faculty with some of the material and supplies needed for their courses and provided them with teaching and “Focus on the Workplace” opportunities. They also delivered three one day camps on their campus with 150 grade 8 students, six teachers and three parents attending. VC and it’s industrial partners in Orlando are working collaboratively on the design and delivery of two-day LFO workshops that will be offered twice per year to approximately 40 science teachers (20 per camp).

CCCC displayed their Laser program to high school counselors from service area counties attending an Information and Planning Conference. They recruited a program graduate to serve on a luncheon program panel describing how

he benefited from the CCCC program. The conference included 30 counselors. Also, two program tours were conducted for prospective students and included new recruiting and informational presentations.

Goal 6. Recruit and assist returning veterans and minorities to enter LFO programs in the southeast US.

IRSC and VC met this goal satisfactorily while CCCC is just beginning the process. IRSC hired a graduate from RPI who is a Navy veteran, as a full-time laser and fiber-optic lab technician who will be able to relate to the veteran community. They participated and presented at the IRSC veterans and dependents orientation and advised and informed returning veterans about LFO academic and career opportunities. They worked closely with the veterans affair coordinator to ensure streamline veterans admission, developed, printed and disseminated outreach materials addressed specifically to the military audience and provided information transition assistance programs and veterans education and training services to Laser-Tec college partners. They joined the ACP AdvisorNet Community to advise veterans and retired military about the LFO program. Various veterans services of Central Florida were contacted and educated about the academic and career opportunities in the LFO field.

VC met with the Office of Veterans Affairs Director at the college to promote the laser and optics program to veterans. They are in the process of producing program materials to be given to veterans by the office staff. There are currently 28 veterans majoring in Electronic Engineering Technology and nine of them are pursuing the Laser and Photonics specialization/certificate program. VC has had two meetings with the veterans division of the Career Source of Central Florida to create ways of communicating and promoting the LFO program to veterans.

CCCC is coordinating with its veterans office to set up periodic laser and photonics technology program information sessions and tours.

Part IV
Findings

1. **Goal 1.** Assist colleges with existing LFO programs by providing support, professional development, and equipment.

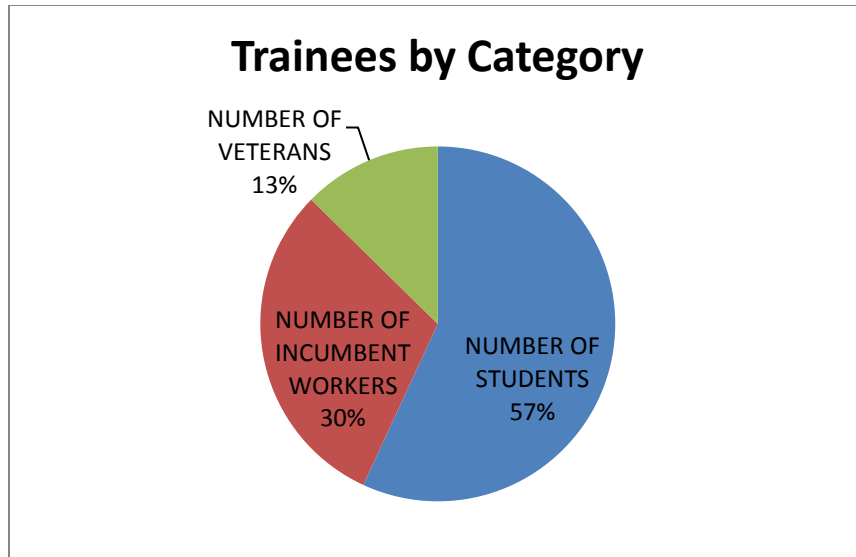
EVALUATION METRICS OF GOAL 1			
Partner	Training manuals developed with LASER-TEC support	Professional development events attended	Funds provided for equipment and supplies
IRSC	8	4	\$27,000
CCCC	4	3	\$34,000
VC	2	2	\$25,000
TCTC	1	1	\$8,000
TOTALS	15	10	\$94,000

(add graphics)

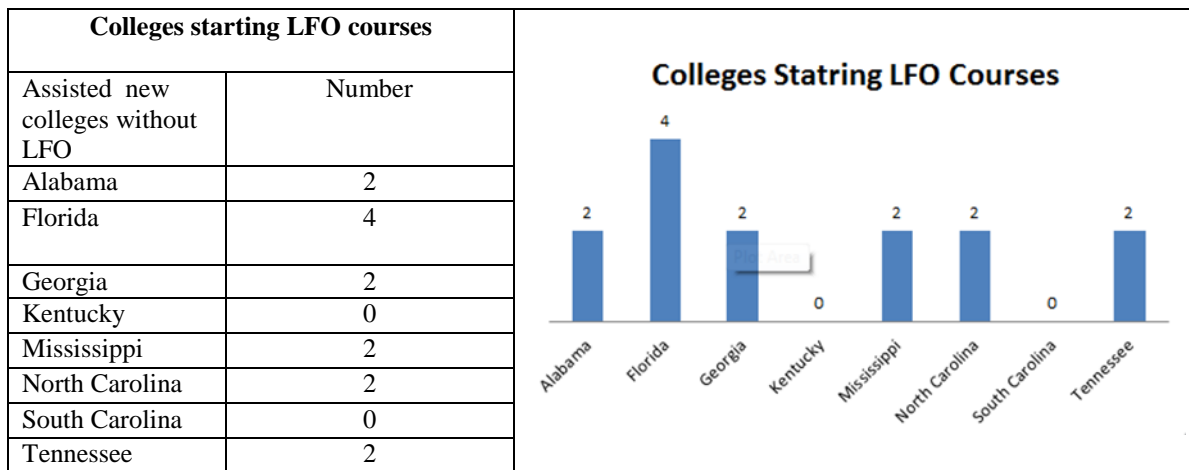
The following table shows the 2013-14 baseline data of student enrollment at all partner colleges.

ENROLLMENT AND TRAINING METRICS FOR GOAL 1				
PARTNER COLLEGE	NUMBER OF LFO COURSES	NUMBER OF STUDENTS	NUMBER OF INCUMBENT WORKERS	NUMBER OF VETERANS
CCCC	5	37	8	2
VC	6	105	14	18
IRSC	2	32	31	2
TCTC	0	0	0	0
TOTALS	13	174	53	22

The following chart summarizes the enrolment data by student category.



Goal 2. Assist colleges without LFO programs to create courses and programs by providing startup support.

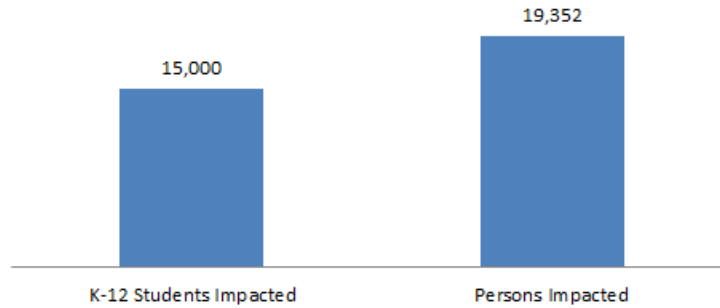


Goal 3. Provide professional development for K-12 STEM teachers to bring LFO career awareness to students to create a high-school-to-college student pipeline.

Goal 3 Metrics				
Teacher Professional Development Events		General Awareness Events		
K-12 Teacher Workshops and Seminars	8		Lab Tours	19
Teachers Trained	120		High school visits	30
Students Impacted	15,000		Middle school visits	25
			Unemployment	9

			offices job fairs, etc	
			Persons Impacted	19,352

Professional Development and Awareness Impact



November 2013 K-12 Professional Workshop Results

Post workshop survey key questions:

- 1. To what degree are K-12 teachers, counselors and administrators satisfied with the content and quality of LFO seminars and the center services? **(Reaction Level)**
- 2. To what degree did K-12 teachers, counselors and administrators understand the need to incorporate LFO modules in life sciences classes and career counseling? **(Learning Level)**

Six-month survey key questions:

- To what degree are K-12 teachers, counselors and administrators incorporating LFO modules in life sciences classes, and career counseling? **(Behavior Level)**
- How many new LFO courses, modules, lessons, and career guidance sessions have been added in K-12 schools, and how many students have attended? **(Results Level)**

School	Teaching subject	Number of students enrolled in your class(es)	Integrate teacher's demonstrations in	Integrate laboratories and hands-on activities in:

NPK8	Engineering STEM	150	Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Interference of light and its applications , Diffraction of light and its applications, Laser operation and applications, Mathematics	Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Diffraction of light and its applications, Laser operation and applications, Marhematics
Vero Beach High School	Science	140	Dual nature of light, Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Interference of light and its applications , Diffraction of light and its applications	Dual nature of light, Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Interference of light and its applications , Diffraction of light and its applications
PSLH	physics	7	Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Diffraction of light and its applications, Polarization of light and its applications, Laser operation and applications	Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Diffraction of light and its applications, Laser operation and applications
Clark ALC	Physics	16	Dual nature of light, Colors, color combinations, applications , Laws of Reflection and Refraction and their applications , Interference of light and its applications , Diffraction of light and its applications, Polarization of light and its applications, Laser operation and applications	Colors, color combinations, applications , Laws of Reflection and Refraction and their applications

Vero Beach High School	Physical Science	140	Dual nature of light, Colors, color combinations, applications, Laws of Reflection and Refraction and their applications, Interference of light and its applications	Dual nature of light, Colors, color combinations, applications, Laws of Reflection and Refraction and their applications
------------------------	------------------	-----	--	--

April 2014 K-12 Professional Workshop Results

Post workshop survey key questions.

1. To what degree are K-12 teachers, counselors and administrators satisfied with the content and quality of LFO seminars and the center services? **(Reaction Level)**

2. To what degree did K-12 teachers, counselors and administrators understand the need to incorporate LFO modules in life sciences classes and career counseling? **(Learning Level)**

LASER-TEC WORKSHOP "LASERS & FIBER OPTICS", April 10-11, 2014

POST WORKSHOP EVALUATION DATA

Responses	5- Excellent	4	3	2	1- Unsatisfactory
Q3. Overall, how valuable was the content presented at this workshop?	7 out of 7 100%	0	0	0	0
	5- Likely	4	3	2	1- Unlikely
Q4. How likely are you to implement some of the classroom demonstrations into your lessons?	13 out of 13 100%	0	0	0	0
Q5. How likely are you to implement some of the theoretical modules of light, lasers, and fiber optics into your lessons?	6 out of 7 86%	1 out of 7 14%	0	0	0

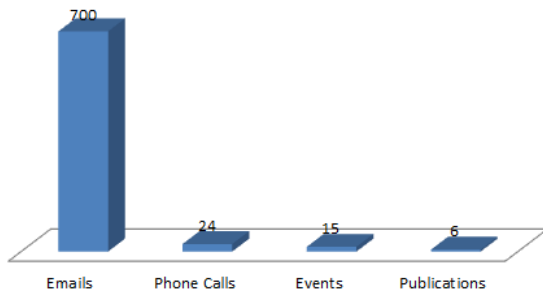
Q6. How likely are you to implement some of the lab work for light, lasers, and fiber optics into your lessons?	6 out of 7 84%	1 out of 7 16%	0	0	0
Q7. How likely are you to start a laser and fiber optics course at your school?	0	1 out of 7 14%	3 out of 7 43%	2 out of 7 29%	0
	5- Excellent	4	3	2	1- Unsatisfactory
Q8. Overall, how would you rate this professional development event?	5 out of 7 72%	0	0	0	0
	Yes	No			
Q9. Would you recommend this workshop to a colleague?	5 out of 7 72%	0	0	0	0

Note: 1 person did not answer Question 7 and 2 people did not answer Questions 8 & 9.

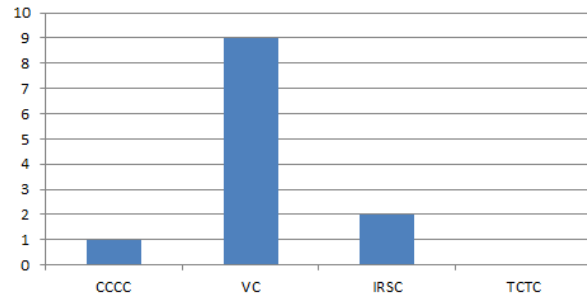
Six-month survey will be conducted in October 2014.

Goal 4. Create awareness of LFO careers and a clear pathway for returning veterans to recruit them for participating regional college programs.

Reaching out to Veterans



Veterans per Partner College



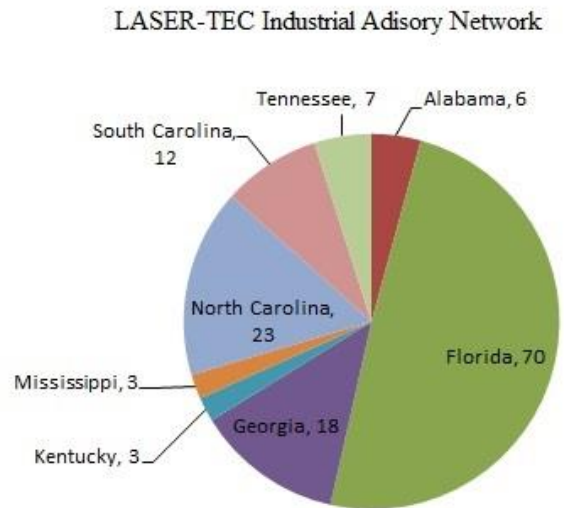
Goals 5. Develop, expand, and strengthen partnerships between LFO industries and all regional colleges.

COLLEGE	EXPANDED INDUSTRIAL PARTNERSHIP
IRSC	Corning Optical Communications, PCS Fiber, Anixter, ITS Fiber
VC	Northrop Grumman, L3 Communications, Orlando Science Center
CCCC	Wasatch Photonics, Synoptics, MegaWatt Lasers, Duke University
TCTC	Bosh, BMW

(add graphic)

Goal 6. Expand the membership of the Industrial Advisory Board (IAB), and monitor the supply, demand, and skill-set needed by LFO technicians in the Southeast region through a strong Industrial Advisory Board.

LASER-TEC Industrial Advisory Network	
State	Number of members
Florida	70
North Carolina	23
Georgia	18
South Carolina	12
Tennessee	7
Alabama	6
Kentucky	3
Mississippi	3



Part V

Is the program successful?

Conclusion

LASER-TEC succeeded in accomplishing the primary mission it set out to perform. They assisted the colleges with both existing and non-existing laser and fiber-optic (LFO) programs with support and programs and acquisition of new lab equipment. They held professional development workshops to aid K-12 STEM teachers improve their knowledge in optics, lasers, fiber optics, and bring awareness of LFO career opportunities. LASER-TEC helped recruit returning veterans with presentations, email campaigns, newspaper articles, with information about LFO career education. The colleges built and strengthened existing partnerships with local LFO industries and regional colleges while setting up expanded member Industrial Advisory Boards.

It is recommended LASER-TEC continue to expand partnerships with their industrial partners using their Industrial Advisory Boards for contacts and advice. Furthermore, emphasis on training the returning veterans to successfully become LFO technicians should be pursued by exploring other avenues of contacting them before they transition to civilian life.