

# **Connecting 2-Year Faculty Professional Development with Technology and Student Learning Perceptions in Online Environments**

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Dr. Kris Frady is the Director of Operations for the Clemson University Center for Workforce Development. Additionally, she has earned experience in the corporate sector working with Blackbaud Inc., designing and delivering professional training seminars in online, blended, and live environments. She also has experience in the educational sector in both live and online environments as an adjunct instructor in computer technology for Greenville Technical College and as a Career and Technology Education teacher.

Kris earned a B.S. in Management from Clemson University, a Masters of Arts in Teaching in Business Education from the University of South Carolina, and an Ed.D. in Curriculum and Instruction with an emphasis in Educational Technology and online learning from the University of Florida.

Her research interests include implementation of digital learning solutions in technical and vocational education, development of career pathways utilizing stackable certificates, educator professional development in communities of practice, and analysis of economic development and industry factors impacting education and workforce development.

She is a licensed South Carolina Educator and serves on various boards to assist with implementation of workforce development is a statewide model including: the Anderson, Oconee, Pickens Showcase board, the technical college led Partnership for Academic and Career Education, Oconee County Work Ready Community Board of Advisors, and Pickens Career and Technology Center Advisory Board.

In over 10 years in development of educational and training materials Kris has designed and delivered professional development and training courses and seminars for 501-c3 organizations across the United States. Her experience as a professional educator has supported her development of educational resources, knowledge of P-12 and technical college systems and needs, and passion for educating youth. In her role as Director of Operations for the Center for Workforce Development she has guided development and assessment of innovative online educational material and the integration of digital learning and visualization tools. She has been part of a team involved in disseminating those results and models throughout numerous national conferences and peer reviewed conference papers. Finally, as part of an overall team she has worked to develop a system wide support network consisting of all 16 South Carolina technical colleges, state funded organizations, National Science Foundation Advanced Technological Education Centers across the United States, P-12 schools and districts across South Carolina, and many manufacturing industry partners to create pathways and resources for supporting advanced manufacturing advocacy and opportunities impacting employability and economic development across the Southeast.

#### Dr. Rebecca S Hartley, Clemson University Center for Workforce Development

Rebecca Hartley has spent the past seventeen years working in higher education administration in the areas of undergraduate admissions, graduate admissions, academic records, and student affairs. She holds a Ph.D. in Public Administration and Public Policy from Auburn University. Prior to joining the Clemson University Center for Workforce Development as the Director of Pathways, she served as Director of Graduate Admissions & Records at the University of Montevallo in Alabama. Her research interest and expertise focuses on citizen public opinion as it relates to federal and state public policy. Additionally, her research focus includes how outside political interests affect policy agendas and specifically policy implementation.

#### Dr. Kapil Chalil Madathil, Clemson University

Dr. Kapil Chalil Madathil's area of expertise is in applying the knowledge base of human factors engineering to the design and operation of human-computer systems that involve rich interactions among people and technology. His research covers the entire spectrum of system design: from identifying the user needs to designing and developing systems that inform and motivate user behavior and empirically



evaluating the efficacy of these interventions. He draws on qualitative and quantitative methodologies including ethnography, contextual inquiry, surveys and controlled behavioral experiments to understand how humans perceive, make sense of, and interact with complex human-machine systems.

#### Dr. Hope Epps Rivers, South Carolina Technical College System

Hope E. Rivers is the Executive Vice President of the South Carolina Technical College System. She holds a Doctor of Philosophy in Educational Administration degree from the University of South Carolina (USC). Dr. Rivers is responsible for promoting communication and collaboration between the State Technical College System Office and partnering agencies across the state. She also works closely with the Presidents, the Vice Presidents of Academic and Student Affairs, Deans, and Directors at the 16 technical and community colleges in all areas related to curriculum and instruction, student services, research, and System advocacy. She serves as the primary technical college system liaison to the SC Commission on Higher Education, certification boards, and a diverse group of agencies designed to address the educational and workforce needs in the state. Additionally, Dr. Rivers is the principal administrator and manager of several federal and state grants, which are distributed to the technical and community colleges across the state. Her 20+ years of higher education experience provide a wealth of knowledge to draw from for a host of state-wide initiatives.

#### Ms. Elaine L. Craft, Florence-Darlington Technical College

Elaine L. Craft (Florence-Darlington Technical College, Florence, SC) holds a baccalaureate degree in chemical engineering from the University of Mississippi and a MBA from the University of South Carolina with additional graduate studies in mathematics. Her experience includes working as an engineer in industry as well as teaching and administration at community college and state levels. She has served as Director of the South Carolina Advanced Technological (SC ATE) Center of Excellence since 1994, leading initiatives and grant-funded projects to develop educational leadership and increase the quantity, quality and diversity of highly skilled technicians to support the American economy. Currently serving as Principal Investigator, Mentor-Connect: Leadership Development and Outreach for ATE; Co-Principal Investigator, ATE Regional Center for Expanding Excellence in Technician Education; and Co-Principal Investigator, ATE Regional Center for Aviation and Automotive Technology Education Using Virtual E-Schools (CA2VES). The SC ATE Center is widely known for developing and broadly sharing successful educational models and practices in technician education, with a particular emphasis on faculty development in problem-based learning, the first year of study for success in engineering and technology majors, and mentoring educators nationally.

#### Dr. Stephanie Denise Frazier, South Carolina Technical College System

Dr. Stephanie Frazier has been employed since 2007 with the SC Technical College System (SCTCS) and currently serves as the Associate Vice President for Curriculum and Instruction. In this role, she manages activities related to new program development, curriculum management, articulation and transfer, and professional development. She believes strongly in the concept of the scholar practitioner, and works to promote the System through research, grant writing, and case study development. She has led the implementation of several first-time initiatives for the SCTCS, to include a state-wide teaching and learning conference, and a state-level program to support females enrolled in information technology programs. Prior to joining the SCTCS, Dr. Frazier worked for several years with the University of South Carolina TRIO Programs as a counselor and technology coordinator. She also has experience as an instructional designer in the private sector, and as a training and marketing coordinator for SC Educational Television. A proud first-generation college student, she earned a Ph.D. in Higher Education Administration from the University of South Carolina. Her research interests include mobile learning, faculty development, and women in community college leadership.

# Connecting Two-year Faculty Professional Development with Technology and Student Learning Perceptions in Online Environments

### I. Introduction

Improved professional development experiences for educators are important in improving student learning and initiating school change.<sup>i</sup> High quality faculty learning experiences, integrating emerging technologies, have to potential to advance innovation and achievement in teaching and learning.<sup>ii,iii</sup> The most effective forms of professional development connect practice to student learning, build strong relationship and networks among other educational professionals, and incorporate collaborative and collegial approaches.<sup>i, iv</sup> Professional development opportunities focusing on best practices related to incorporation of technology into learning experiences are of interest to both faculty and students.

In development and implementation of the professional development sessions, the Clemson University Workforce and Education Research Center (WERC) which also operates the National Science Foundation Advanced Technological Education (NSF ATE) Center for Aviation and Automotive Education using Virtual E-Schools (CA<sup>2</sup>VES), and the South Carolina Technical College System (SCTCS), are partnering to leverage and build on the prior successes of the existing professional state technical college system system-level professional development activities which provide a forum for professional development and networking with faculty across the state. In these professional development programs, WERC/CA<sup>2</sup>VES and the SCTCS will co-develop a summer professional development conference focusing on integrating technology and virtual reality into educational practice as well as emphasizing integration of soft skills. Further, the findings from the student survey will indicate emphasis areas for faculty related to technology integration in two-year technological education classrooms. All professional development activities will focus on faculty-centered strategies that systematically improve the quality of teaching and instructional experiences emphasizing active learning and differential education strategies including nontraditional lecture strategies that support active learning, engage learners, and customize learning. Additionally, the NSF ATE South Carolina Advanced Technological Education Center of Excellence (SC ATE) and key investigators have collected best practices and have extensive experience in conducting professional development in two-year college technological education setting and have partnered to include these perspectives throughout this paper.

In this paper these organizations will share relevant literature which informed the development process and findings related to emerging professional development modules. In future presentations and papers this team looks forward to sharing outcomes and assessments of the professional development trainings conducted in Spring and Summer 2016.

### **II. Literature Review**

Professional development for educators holds some of the greatest promise for impacting academic achievement and educational reform.<sup>i</sup> However, although professional development

is extremely important often many professional development experiences need improvement and have been described as "woefully inadequate [where it is] fragmented, intellectually superficial, and do[es] not take into account what we know about how teachers learn<sup>v</sup>." Research indicates that one method to improve professional development emphasizes integrating emerging technologies, as a key component of advancing innovation and achievement in teaching and learning, into professional education experiences for faculty. One such emerging technology is integration of online professional development; a platform which provides flexibility of schedule, location, and integration of real-time authentic work-embedded support.<sup>vi</sup> Online and technology enhanced professional development also provides a more systematic approach to professional learning.<sup>vii</sup> Emphasis on improved professional learning opportunities for faculty presents a vehicle to impact academic achievement, professional learning communities and collaborative professional development opportunities have been recognized as strong options to help impact school change.<sup>vii</sup>

As two-year college administrators continue to assess methods for institutional sustainability, their faculty members are simultaneously challenged with engaging a student population that is considerably more diverse than other sectors within higher education. The student demographic at two-year colleges varies significantly not only by age, but by ethnicity, enrollment patterns, and socioeconomic status. Consequently, two-year college faculty are responsible for managing a complex range of learning styles and technical skill proficiencies, including those students who require developmental coursework.<sup>viii</sup>

Despite the differences that exist among the student demographic, the literature speaks consistently to shared expectations among today's two-year college students for flexibility, responsiveness, and innovation in their educational experiences. <sup>ix</sup>, <sup>x</sup>, <sup>xi</sup> Consequently, ongoing discussions among key stakeholders explore the best approaches for meeting multi-faceted student demands.

Hartman, Dziuban, and Bophy-Ellison<sup>xii</sup> explain that, for the first time in their careers, faculty members are expected to teach students differently from the ways in which they were taught. A paradigm shift has occurred, focusing more on a learner-centered model and less on teacher-centered instruction. As a result, faculty need to become more and more like master jugglers, addressing not only course content, design, and execution, but also various technologies, such as the course website, multimedia equipment, and instructional software. In many instances, faculty members did not enter their profession because of a strong love for technology. Yet they find themselves in the midst of rapidly changing learning environments where technology proficiency is becoming the norm. <sup>xii</sup> Therefore, Del Favero and Hinson<sup>xiii</sup> further assert that contexts of learning for today's community and technical college students, in particular, require technological competencies for all involved.

Efficient training and professional development have been identified in the literature as critical components of successful technology adoption. Quick and Davies<sup>xiv</sup> conducted a qualitative study of 18 two-year college faculty members and inquired about the necessary tools for their ideal course design. The majority of participants indicated that access to the latest software, along with technical support and staff development were the primary resources they would require. Staff development should fit their class schedules and campus location. A mentor

or primary point of contact would be helpful for follow-up questions. Additionally, respondents wanted adequate time to develop their ideas and to incorporate them into their instruction. Furthermore, they noted fiscal support as an important part of their ideal curriculum development plan.

Quick and Davies <sup>xiv</sup> provide an ephemeral view of professional development and course design needs among two-year college faculty. Other studies, however, specifically examine factors influencing technology adoption among two-year college faculty and staff based on generational differences,<sup>xv</sup> organizational culture,<sup>xvi</sup> and academic disciplines.<sup>xvii</sup> Additional research explores faculty perceptions and use of evolving twenty-first century concepts such as mobile learning.<sup>xviii</sup>, <sup>xix</sup> Each of these studies offered evidence in support of technology as an important tool for enhancing instruction. The presence of professional development, institutional support, and the availability of practical examples emerge as recurring themes for facilitating the integration of technology into community college instruction.

Challenges for implementing professional development programming do exist. Successful professional development opportunities require access to a variety of resources to include personnel, funding, and faculty release time. Yet, despite the renewed prominence and increased public awareness of the sector, community colleges remain woefully underfunded by state and local governments.<sup>xx</sup> Consequently, administrators must find economical and creative ways to implement training. Furthermore, Smith<sup>xxi</sup> describes challenges associated with engaging part-time or adjunct faculty members in training opportunities.

Finally, challenges exist with the implementation of strategies into practice once training is complete. This challenge is largely associated with the dichotomous nature of the digital divide among the student population. Though the demand for responsive and innovating learning is present, two types of students exist. The first level in the divide in one of access to hardware, software and broadband Internet connections and the second level is a divide in knowledge in digital literacy on how to use the technology.<sup>xxii</sup> Taking both levels into consideration, faculty cannot build curricular activities that assume all owners can send or access large amounts of data.<sup>xxiii</sup> Additionally, faculty must understand that students' general comfort level with technology may not match their competency with technology used in an educational environment, as their underlying understanding of technology may be shallow.<sup>xxiv</sup>

Nevertheless, the need for ongoing training and faculty development remains. Progress in this area can continue parallel with open dialogue among stakeholders and ongoing assessment. Though the use of technology advances at an almost logarithmic pace, many of the issues related to technology use remain remarkably constant. These issues include properly trained staff, adequate equipment, sufficient funding, and effective integration of technology in order to maximize learning.<sup>xxv</sup> The work discussed in this paper attempts to offer collaborative solutions for ensuring that two-year college faculty have the training necessary for success.

### **III. Previous Professional Development Examples**

This paper presents several examples of professional development focused on two-year college instructor professional development and secondary educator professional development to emphasize the importance of technological education pathways. Each organization collaborating

on this paper selected cases and best practices which have emerged from several years of professional development experience. These cases have been implemented in broad regional or statewide applications however, the framework is flexible enough that these types of professional development could also be offered at a single school site.

# *A. Clemson University Workforce Education and Research Center (WERC) & NSF ATE Regional Center CA<sup>2</sup>VES*

# i. STEM Educators Forums

WERC and CA<sup>2</sup>VES have hosted several STEM Educators Forum for education representatives in multiple locations across South Carolina. Over 200 educators, non-profit, governmental agency, and industry representatives have attended these events. Partners for these forum events have included the WERC and CA<sup>2</sup>VES, South Carolina's Coalition for Mathematics & Science, Clemson Office of Economic Development, the Southeaster Institute for Manufacturing Technology (SiMT), Clemson University International Center for Automotive Research (CU-ICAR), and the South Carolina Advanced Technological Education Center of Excellence (SC ATE). In addition to industry panel discussions and digital learning demonstrations, breakout sessions were held with small groups identifying challenges and opportunities for improvement in STEM education in South Carolina.

Analyzing the discussions provided the following findings.

- Participants noted that there is a negative perception of manufacturing in both students and parents in South Carolina. Resources need to be used to tackle the stereotypes and biases that exist around manufacturing careers.
- Digital learning applications could advance and improve STEM education methods in the classroom. Participants were enthusiastic about the opportunities that digital learning can provide to students.
- Current traditional education methods are ill-equipped to prepare students for highly technical careers. Educators suggested that schools move away from standardized learning, and focus more on employability skills such as critical thinking, soft skills, professionalism, and technological skills to better prepare students for the workforce.
- Participants agreed that educators need additional STEM training and education in order to properly implement STEM education in their classrooms. Suggestions for professional development included "Educators in Industry" programs to provide teachers with technical job experience, best practices tours of South Carolina schools with successful digital learning and STEM curriculum, and improvements to teacher education to include further technical skills. These programs would enhance teacher skills and abilities for the application of technical STEM education in their classrooms.

After these forums, participants have reported feeling optimistic about the future of South Carolina's education, specifically in areas of STEM. These forums have been very well received by the participants.

- \_94.8% of participants agreed or strongly agreed that they learned more about addressing manufacturing workforce development needs through the innovative curriculum option demonstrated during the forum
- \_87.7% of participants agreed or strongly agreed that they explored ways in which they could use professional development opportunities to draw students into STEM technician education opportunities
- \_77.6% of participants agreed or strongly agreed that they were introduced to ways they could incorporate virtual reality advanced manufacturing simulations into their classroom instruction
- \_93.1% said they would attend a similar event in the future, and would encourage a colleague to attend such an event

The forums were important because they allowed people from different industries to share their opinions and suggestions on how to improve the future of STEM education and how to implement digital learning in the classroom. Further, these forums bring  $CA^2VES$  and its educational partners one step closer to advancing the future of STEM education in South Carolina schools.

## ii. Regional Initiatives

Creating a professional development for teachers to learn more about resources available to them is a key step in ensuring that more students and parents are aware of career options in the state's thriving industries. For WERC and CA<sup>2</sup>VES, it has been an essential focus of the overall center mission to engage industry, educators, students, parents, and the community in a variety of events. Including a range of stakeholders in opportunities to learn more about industry sectors, such as advanced manufacturing in South Carolina, is a way to fill the pipeline with skilled workers who are ready to enter this field.

Beginning in the elementary school level, WERC and CA<sup>2</sup>VES have engaged students with virtual reality simulations that combine the animation of a beetle moving through a turbine engine with learning about what makes the engine work. The exposure of math and science in this capacity helps young students gain more interest than fear of these sometimes difficult subjects. Moving to middle school, this organization has engaged in career fairs and science fair expos where numerous industry and education partners set up booths to display career information to rising eight graders.

It is during the eight grade year that students in South Carolina choose their career cluster. Industries in the advanced manufacturing sector strive to help students explore sustainable careers in fields that have often been thought of with a negative perception in the past. It is a focus of WERC's engagement with educators to ensure the understanding of manufacturing jobs as a field with a variety of skill levels. Students can begin with an entry level position but use that position as a building block into a career with changing job requirements and continuous learning in this evolving, highly technology-driven field.

Across all educational levels, WERC and CA<sup>2</sup>VES have engaged teachers in both small group settings such as summer institutes and large educational conference settings in presentations to encourage digital learning tools in the classroom. Additionally, these sessions have served to promote technician education options and illustrate the sustainability of careers in

advanced manufacturing. The use of a four-year college to promote the state's economic development message is crucial to this type of discussion with educators who, in turn, influence the industry pipeline.

#### iii. Webinars

WERC and CA<sup>2</sup>VES have also delivered a variety of professional development experiences to educators across wide geographic locations via webinars. These webinars have been delivered in a variety of ways, typically utilizing the Adobe Connect platform. In these webinars participants are provided with a web link and materials related to the content being shared prior to the webinar and after are provided with a web link to access the recording if they would like to review key portions or share the webinar with colleagues. These webinars have been held for a variety of purposes. One set of webinars was focused on providing professional development support to instructors of two-year colleges building online learning tools as part of multiple rounds of the Department of Labor Trade Adjustment Assistance Community College and Career Training (DOL TAACCCT) grant programs. These webinars provided information on emerging learning technologies and hands-on support in instructional design and use of CA<sup>2</sup>VES developed learning design templates and checklists of instructional and assessment material. Another similar webinar was held in conjunction with the Centers Collaborative for Technical Assistance and focused on not only how to integrate educational technology and open educational resources but also on integration of learning theories such as the Universal Design for Learning.

Features of these webinars which received positive feedback from faculty participating included integration of live/interactive polling, providing web links for supplemental information, and built-in opportunities for participants to share their own best practices and feedback with the other participants of the webinar. Another effective strategy has been having at least two knowledgeable moderators conduct the webinar where one can speak and deliver materials and another can quickly address comments and answer questions as they are submitted by the participants via text chats.

#### B. South Carolina Technical College System

#### *i. Faculty Academy*

The SCTCS Faculty Academy was designed to be a component of professional development that provides academic department chairs, faculty leaders, and program managers with a comprehensive training opportunity to enhance skills in leadership, program management, pedagogy, and networking. The curriculum was designed as a nine-month cohort style program, completing all modules and activities together. Modules were conducted both online and in the traditional classroom setting. Opportunities for practical application and use of technology were infused throughout each module. Participants completed a final project and instructional enhancement plan that incorporated tools and techniques learned throughout the academy.

Three cohorts have completed the program. Each cohort has a specific focus area. For example, the third Faculty Academy cohort targeted faculty in the STEM and Information Technology programs. Fourteen persons participated in synchronous and asynchronous

workshops that included topics such as pedagogy, teaching and learning, assessment, and student success.

A total of forty faculty members have received this personalized training. The impact is far reaching as several participants have shared their experiences with other colleagues through campus workshops, conference presentations, and journal publications. Several of the participants have presented their final projects at board meetings conducted by the South Carolina State Board for Technical and Comprehensive education. Additionally, several of the participants have received advanced positions, and attribute their growth to participation in the Faculty Academy program.

## *ii. Faculty Institute*

The South Carolina Community College Presidents and Chief Academic Officers wanted an academic leadership program designed to provide academic department chairs and faculty with comprehensive training to enhance skills in leadership, program management, pedagogy, and networking and the SCTCS responded with the innovative Faculty Academy Program. Each community college selected instructors to participate in the Faculty Academy. As a result of the huge demand to participate in the Faculty Academy program, in the fall 2015, the SCTCS revised the Faculty Academy format. Faculty Institute was developed to offer shorter training institutes that will accommodate a larger number of participants. The first institute, titled "Back to Basics," was designed to offer training on basic curriculum topics that will foster success in the classroom. The sessions were conducted by outstanding community and technical college faculty and renowned faculty from the University of South Carolina.

- Day One consists of three optional, pre-institute workshops focusing on educational technology and the role of adjunct faculty in community colleges. These are concurrent sessions with a limited number of seats for each session that will be available on a first-come, first-serve basis.
- Day Two consists of a series of curriculum-based sessions for all participants on topics related to student learning, student engagement, classroom management, and teaching techniques.

42%	1-5 years of teaching
62%	Teach online courses
1	Adjunct
78%	Interested in academic leadership
100%	Interested in learning new technology

Table 1. Faculty Institute Participant Profile

Feedback from these programs has been overwhelmingly positive with evaluations revealing comments such as, "This was a great experience! I was exposed to new ideas and technologies that will help me be a better instructor" and "This has been an incredibly rewarding experience and has made me a better leader." Also, upon reflection of these programs the

SCTCS has developed these key takeaways for other programs interested in implementing similar programs: take ownership of your program, start planning early, identify key outcomes and deliverables, pilot curriculum if possible, and remain flexible.

# iii. Teaching and Learning Tuesdays

Opportunities exist for professional development on a broader level. Approximately 350 part-time and full-time faculty and staff have been trained over the past academic year through the Teaching and Learning Tuesdays (TLT) Series. TLTs provide monthly online programming focused on new and innovative ways to incorporate technology into community college instruction. Sessions are designed to enhance pedagogical practice in support of overall student retention and success.

As needed, TLT sessions target special topics aside from technology. For example, four sessions this year addressed mandated compliance regulations under the recently approved legislation for Title IX (i.e., prevention of discrimination against protected classes). Topics are chosen based upon the emerging needs of the colleges. The SCTCS staff keep their finger on the pulse of new and innovative topics as they emerge throughout the country. Experts on the various topics are invited to be the featured presenter at one of the monthly TLT webinars. This type of professional development training is extremely attractive to adjunct professors. Because each session is recorded, faculty have the option to view the session during the time that is most convenient for them. The questions that were posed during the live session are captured as part of the recorded session. This helps the viewer to have a true sense of the interaction and dialogue that took place during the synchronous session.

# TLT Website: www.sctechsystem.edu/TLT

# iv. Professional Development Site (T-Web)

This site is in its infancy. It is designed to promote asynchronous, self-paced training. Participants can print certificates of completion for self-paced modules. The blog will include guest writers from the System. The SCTCS will also use social media (Twitter, Instagram) to promote initiatives and collaboration among faculty and staff.

## v. Journal (coming in 2016)

The aim and scope of the journal is to lead South Carolina in the publication of scholarly peer-reviewed research and discourse on community colleges. The target audience includes higher education leaders, faculty, administrators, counselors, trustees, policy makers and researchers studying community college education.

The journal is a multidisciplinary forum for scholar practitioners in the community college setting. It promotes the production and advancement of scholarship on community colleges and welcomes manuscripts addressing all aspects of community colleges, including administration, education, and policy.

# vi. SCTCS Plugged-In a Statewide Teaching and Learning with Technology Conference

The Teaching and Learning with Technology Conference focused on providing an opportunity for brainstorming, collaboration, and professional networking. The conference theme: "SCTCS: Reboot. Redefine. Reconnect." represents the call for innovation, assessment, and creativity within the System. More specifically, the conference program highlighted the role of technology in pedagogical practice, assessment, and student retention through five distinct strands: mobile computing; social media; online and distance learning; leadership, management, and governance; and digital discovery. Conference attendees included faculty, staff (e.g., librarians, instructional designers, distance learning coordinators, etc.), and administrators (e.g., Chief Academic Officers, Chief Student Services Officers, and Institutional Effectiveness Officers). Presenters were represented by individuals from these same groups, as well as renowned speakers from business and industry, and peer institutions in other states. Conference programming earned the SCTCS recognition as a finalist for the prestigious Bellwether Award, given by the Community College Futures Assembly.

## C. NSF South Carolina Advanced Technological Education Center of Excellence (SCATE)

### i. SC ATE Exemplary Faculty Project

The South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty project addresses the issue of restructuring the learning environment to prepare two-year technical college students to compete in today's high performance global marketplace. The specific goal is to create a cadre of exemplary faculty teams for the express purpose of implementing innovative research-based advanced technological education practices across the SC Technical College System. The major objectives are to: (1) Develop and implement a comprehensive Faculty Development Program for ATE that addresses faculty development needs in advanced technological education content, effective pedagogy, and assessment of student learning outcomes; (2) Develop, pilot test, and implement research-based curricular reform in advanced engineering technology programs; and (3) Evaluate implementation processes and materials and disseminate successful processes and products at the local, state, and national levels. Methods include involving interdisciplinary faculty teams from across the sixteen colleges in intensive professional development activities; implementing a system-wide electronic communications system based on the concept of a physical conference room; and instituting project-based peer teams to design and implement new curriculum materials and instructional strategies. The primary target audience is mathematics, physical science, engineering technology and communications faculty members. Collaborative partners include Clemson University and the National Dropout Prevention Center at Clemson, the SC State Department of Education (SSI and Tech Prep Programs), SC ETV, the Academy for Educational Development, and the Virginia Community College System. This project represents an innovative approach to systemic reform in professional development and seeks to coalesce the strengths of individual faculty members into a unified effort to move the entire system forward in advanced technological education practices.

# *ii. Integrated Geospatial Education and Technology Training: Remote Sensing (iGETT: Remote Sensing)*

Project participants, for this professional development experience, were drawn from all STEM disciplines that employ geospatial technology. Recruiting focused on nationwide

representation and strong participation by institutions with underserved populations. The participants have in common solid backgrounds in GIS and administrative support for the development of model geospatial programs. Selected participants attended two-week summer institute focused on remote sensing and related GPS applications, the integration of these technologies with GIS, and workforce applications of geospatial technologies. During the following academic year, they complete an on-line remote sensing course and work with project staff to develop model programs that integrate GIS, GPS, and remote sensing. A second weeklong summer institute helps them finalize their model programs. The iGETT website provides detailed descriptions of these programs in order to facilitate similar initiatives at other institutions. Peer-tested teaching resources are being widely disseminated to other institutions through a project website, further broadening the impact of the project. Project outcomes include industry-relevant training to meet the growing national need for remote-sensing technicians, as well as workforce needs in other high-growth geospatial industries.

### *iii. Out of the Box*

How does a state-wide system of two-year technical colleges produce enough engineering technology graduates to meet the needs of high-tech employers? South Carolinians are thinking "out of the box" in addressing this challenge. The South Carolina Technical Education System's Advanced Technological Education (ATE) Initiative is taking an innovative, faculty- first approach to foster systemic reform in engineering technology education.

The SC ATE Initiative is being fueled by two significant grants from the National Science foundation (NSF): the SC ATE Exemplary Faculty Project and the SC ATE Center of Excellence. Out of the Box addresses outcomes for the SC ATE Exemplary Faculty Project. Remarkable results are being achieved through the SC ATE Exemplary Project as science, mathematics, engineering technology and communications faculty work together across the state in interdisciplinary teams for the purpose of increasing the quantity, quality and diversity of engineering technology graduates. By removing the limits of distance, academic discipline and individual endeavor, systemic synergy has resulted. Likewise, through strengthening collaboration and partnerships, the concept of how technical college faculty impact their students and local business communities is expanding.<sup>xxvi</sup>

## iv. Multi-Pronged Retention Strategy Successful In Retaining Engineering Technology Students

A retention strategy that incorporates a new integrated, problem-based curriculum, collaborative, student-centered teaching methodologies, faculty and student teams, and the involvement of industry partners is demonstrating success in retaining students in engineering technology programs in South Carolina.

The SC ATE Center of Excellence is focused on increasing the quality, quantity, and diversity of engineering technology graduates. The SC ATE Center has developed two curriculum components for beginning engineering technology students that integrate the core disciplines for engineering technicians -- mathematics, physics, communications and technology. SC ATE industry-based problems are providing a mechanism for integrating these subjects and an important new context for learning. SC ATE classrooms model the workplace from the physical set up of the classrooms to the use of student teams to solve problem scenarios. By

modeling the classroom and instructional approach after the workplace, students are seeing the connections between subjects traditionally taught in isolation and between their study and engineering technology careers.

The SC ATE curriculum is being taught in seven South Carolina technical colleges and one high school career center. Engineering technology retention rates have increased 50-100 percent. In addition, industry has responded to the implementation of the SC ATE curriculum by providing more and better scholarships and meaningful work experiences for engineering technology students through the SC ATE Scholars initiative. Through the ATE Scholars partnerships, industries and colleges work together to recruit and select students as ATE Scholars. The financial support of local industries (tuition, books and paid work experience) and relevant real- world industry exposure is providing additional motivation and incentive for students to complete their program of study.<sup>xxvii</sup>

## **IV. Recommendations & Implications**

In the many years of experience in two-year college education SCATE and key investigators have identified common themes of successful faculty development initiatives. These common themes include:

1. <u>Work with faculty over time</u>. A one-time event is ineffective for anything more than raising awareness. New strategies take time to master and behaviors or teaching habits take time to change. The more in-depth the training and the more frequent the reinforcement, the more likely that students will benefit and the change in teaching methodology will last. The exemplary faculty project (SC) worked with faculty over a 3-year time frame. The iGETT projects engaged faculty in 1-2 week faculty development immersion experiences each summer with webinar follow-up throughout the year.

2. <u>Model the best teaching methodologies when delivering faculty</u> <u>development.</u> "Practice what you preach" vs. "do as I say, not as I do."

3. <u>Work with faculty away from their normal teaching environment.</u> Having a teacher's undivided attention is critical to success. When training occurs on campus, the likelihood that a teacher will be distracted by day-to-day activities increases dramatically, whether it is email, phone calls, or students or others stopping to talk in the hallways. SC faculty development activities were each held at a different college location to familiarize faculty with other campuses across the SC Technical College System. iGETT workshops were held in locations where exciting geospatial technology applications could be observed such as the Earth Research Observation Station near Sioux Falls, SC and near Goddard Space Flight Center, Greenbelt, MD.

4. <u>Paint a realistic picture of change and anticipated outcomes.</u> Be clear that education improvement is an ongoing journey, not a one-time, or immediate fix. Instantaneous and miraculous results will not occur. No matter how well developed and promising an innovation in education is, it will take time, patience, and hard work to see results and to implement strategies in ways that are sustainable. With any implementation that involves change, there will be trial and error at the beginning as both teachers and students adjust

to new technology or new teaching methodologies. Patience and perseverance pay off, and gains in student learning outcomes, access, etc. are well worth the effort.

5. <u>The Hawthorne effect is real.</u> The Hawthorne effect (also referred to as the observer effect is a type of reactivity in which individuals modify or improve an aspect of their behavior in response to their awareness of being observed.<sup>xxviii</sup> The more attention faculty get during implementation, through observation and feedback loops, the greater the likelihood that the implementer will work harder to get it right.

6. <u>Pearson's Law is real</u>: "That which is measured improves. That which is measured and reported improves exponentially." - Karl Pearson Ongoing evaluation and monitoring of data and outcomes, with associated adjustments, will produce better outcomes. Continuing the measurement, evaluation feedback, and continuous improvement loop over time will help prevent back-sliding and discourage lapsing into more familiar, but less effective, teaching strategies and behaviors.

What two-year college faculty need most, therefore, is (1) information about what professional development is available and when; (2) resources required to access the training, e.g., time, travel money; and (3) a supportive administration that values and rewards faculty development and encourages them to try new things. The SC ATE National Resource Center for Expanding Excellence in Technician Education has addressed #1 fully and #2 partially with the www.TeachingTechnicians.org website that connects faculty development providers to faculty development seekers in technician education and related STEM education. Those who register at this website will be notified automatically when a faculty development opportunity is be offered by an ATE grantee anywhere in the nation. Because the site features faculty development that is provided by NSF grantees, the events are low cost or no cost. Some offer teacher stipends for participating and provide participants with classroom-ready curriculum, software, or other resources. Each year, more faculty development is offered via webinar, too, which negates the need for travel. Projects need to attract participants to their faculty development activities, and the Teaching. Technicians.org website provides an excellent way to connect with their target audience. We think of Teaching. Technicians.org as a match-maker for faculty development: it connects seekers to providers in ways that benefit both.

The combined approaches of all of these organizations has resulted in a variety of professional development experiences for two-year college educators and administrators. These investigators continue to review relevant research and assess ongoing professional development activities for interest and impact. It is critical to continue to examine, pilot, and adopt emerging best practices for two-year college instructor professional development to ensure that technological education remains relevant and responsive to the rapidly changing high-tech sector. Further, as funding in higher education becomes more limited designing programs that incorporate the highest levels of institutional support (such as through organizations like the SCTCS), is ongoing (not fragmented, short, or one-off), and is directly relevant to classroom learning and improved educational outcomes will improve instructor confidence and better prepare students for the technological workforce.

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