

CA²VES

CENTER FOR AVIATION & AUTOMOTIVE TECHNICIAN EDUCATION
USING VIRTUAL E-SCHOOLS

Pee Dee STEM Educators Forum

February 25, 2014 | Florence SC, SiMT

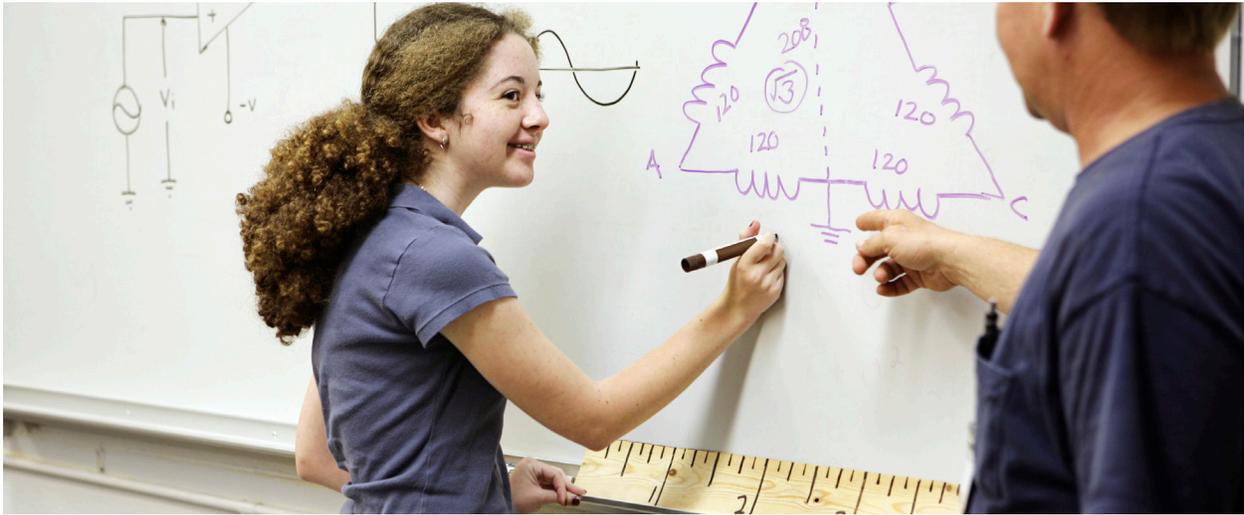
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EXECUTIVE SUMMARY



On February 25th, 2014 the Center for Aviation and Automotive Technical Education using Virtual E-Schools (CA2VES) hosted a STEM Educators Forum for education representatives at the Southeastern Institute of Manufacturing and Technology (SiMT) in Florence, SC.

Partners for the event were the Clemson Center for Workforce Development, South Carolina's Coalition for Mathematics & Science, Clemson Office of Economic Development, and SiMT. In addition to an industry panel discussion and digital learning demonstrations, a breakout session was held with small groups identifying challenges and opportunities for improvement in STEM education in South Carolina. Analyzing the discussions provided the following findings.

- 1. Participants noted that there is a negative perception of manufacturing in both students and parents in South Carolina.** Educators acknowledge the lack of interest in manufacturing of students, due to misconceptions about the manufacturing industry and lack of education on the job opportunities available. To change this, participants suggested that manufacturing companies “resell” their image to the public, educators encourage students to pursue technical careers, and schools teach students about the variety of job opportunities available to them in South Carolina.
- 2. 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, but they were apprehensive about the lack of technological resources in the schools, and their own ability to implement digital learning programs.
- 3. 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.

- 4. 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 SC 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 the event, participants felt optimistic about the future of South Carolina’s education. The forum 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. This forum brings CA2VES and its educational partners one step closer to advancing the future of STEM education in South Carolina schools.

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OVERVIEW OF CAAVES



The Center for Aviation and Automotive Technology Educations using Virtual E-School [CA2VES] exists for the advancement of automotive and aviation technician education programs across South Carolina. CA2VES is comprised of Clemson University, the SC ATE National Center, Florence-Darlington Technical College, Greenville Technical College and Trident Technical College, and has established partnerships with SpaceTEC®, AMTEC, CARCAM, and many

aviation and automotive industries throughout the state. The objectives of CA2VES are:

1. Creating a virtual e-school by expanding automotive and aviation (A2) technician education programs via innovative and cost-effective e-learning options
2. Increasing access in order to support recruitment and learning for automotive and aviation students through this SC- A2 network
3. Broadly disseminating advanced technology e-learning modules for use by automotive and aviation technician education programs and industry
4. Advancing the long-term workforce impact of CA2VES initiatives and programs.

CA2VES will create a regional community of scholars among research universities, community colleges, P-12 educators and industry to implement the next generation of aviation and automotive manufacturing technology curricula. Results are expected to significantly improve student learning and to encourage underrepresented students at two-year colleges to study aviation and automotive maintenance. National Science Foundation Advanced Technological Education center partnerships will expand implementation and impact across the southeastern region and nationally.

In recognition of the importance of a system wide approach to A2 technician education, CA2VES engages in a variety of programs and partnerships. A broad range of P-12 experience and expertise has been built through partnerships with the following organizations:

The South Carolina Coalition for Mathematics and Science works together with advocates from industry, education, government and community organizations to promote quality in science, technology, engineering and math education (STEM) in South Carolina. Through advocacy, professional development, instructional material support, innovation, and research and evaluation, SCCMS aims to make South Carolina a national leader in these fields of education.

The Clemson University International Center for Automotive Research (CU-ICAR) is an advanced-technology research campus where academia, industry and government organizations engage

in synergistic collaboration. ICAR supports efforts to extend STEM opportunities in K-12 schools throughout South Carolina.

The Clemson University Office of Economic Development works with public and private partners to create jobs in SC, in keeping with Clemson University's teaching, research and outreach missions.

PURPOSE OF THE FORUM



The STEM Educators Forum was held on February 25, 2014 at the SiMT facility in Florence South Carolina, as a means to gather information on the needs of South Carolina educators with respect to science, technology, engineering, and math (STEM) education initiatives. Participants were invited to share their ideas and concerns about South Carolina's education and to provide suggestions for workforce improvement and development for the future. In addition to this, educators were asked to provide their opinions on digital learning and its applications in STEM education.

A variety of educators, industry partners, and workforce development organizations were represented at the STEM Educators Forum. These participants came from the Pee Dee area of the state to engage in discussion about the future of digital learning and STEM education. Over 100 educators from the Pee Dee area attended this forum. The companies represented included Honda, Sonoco, and the South Carolina State Chamber of Commerce. Attendees participated in small discussion groups and feedback sessions, and presentations on the future of workforce and STEM education.

OVERVIEW OF ACTIVITIES



The five hour forum began with registration of participants and an opening session discussing an introduction to workforce development, presented by CUCWD and SCCMS. Next, each industry representative gave a brief presentation on their company, and their workforce needs. These representatives then participated on an Industry Panel where educators asked questions about their partnerships with education and the future of manufacturing.

Following the panel discussion and a break for lunch, representatives from CUCWD gave an interactive presentation on innovate technologies for STEM classrooms, including digital learning resources such as the Educate Workforce platform. During the presentation, educators were given opportunities to share their experiences with digital learning and provide some examples of tools that they have found useful in their classroom. Next, after a short break, the participants were then separated into groups for small group discussion.

Group Discussion Session There was one 40 minute long discussion session and then 10 minutes where each group shared their ideas with everyone. Each group was led by a moderator who read the prewritten scripts including open ended questions and guided discussion.

During the discussion session, the small groups discussed the needs and challenges of the education system in South Carolina with respect to STEM education. In addition to this, the groups discussed how digital learning could be integrated into the classroom and the associated benefits and drawbacks of these new learning methods.

After the small group discussion sessions, there were two more presentations. The first was given by the SCCMS and South Carolina STEM Centers on some of the best practices in STEM education and how educators should be striving to improve their methods. The second presentation was given by the Director

of the SC ATE Center on the future of technological education and how we can be involved in it. Both of these final talks served as a call to action for everyone at the forum and encouraged educators to strive to improve STEM education in our state.

Lastly, the forum ended with an optional tour of the SiMT facility at which the event was held. Educators learned about the opportunities that SiMT provides and the technological training tools that they use on a daily basis.

FINDINGS



This discussion session was split up into three main topics of discussion: digital curriculum in education, pathways, and professional development. Each discussion topic began with a “Fact or Fiction” statement about education and manufacturing which participants had to decide if it was fact or fiction. Following this deliberation, participants would be given a discussion question related specifically to STEM education. These discussions led to the findings described below.

Digital Curriculum

Fact or Fiction: *“Manufacturing often characterized by the ‘3Ds’ – dark, dirty, and dangerous – is not a sustainable career path in South Carolina.”*

The first Fact or Fiction statement asked participants to discuss the perceptions manufacturing as a career path for technically skilled students. The participants determined that this statement was fiction. Unfortunately, even though this statement is fiction, many parents and students have this negative perception of manufacturing jobs. One participant stated that “people’s perceptions of the manufacturing industry have not caught up with the reality of modern manufacturing.” Educators also talked about how parents are the hardest people to convince. Many South Carolinian

parents lived through the textile industry crash and so they feel that modern manufacturing is not a sustainable career path for their children. Parents then in turn discourage their children from pursuing these types of jobs which leads to a large workforce deficit in our state.

In order to combat this manufacturing myth, forum participants suggested that companies “repackage” and “resell” these job opportunities to the workforce, so they can see that the new age of manufacturing is highly technical, clean, and safe.

Discussion Question: *“Would the type of digital curriculum and virtual reality presented by CUCWD be beneficial in your educational environment? Do you believe that your industry, school, or organization would use these types of tools?”*

The first discussion question addressed the viability of digital curriculum for STEM education in South Carolina. Overall educators were enthusiastic about the integration of digital learning and could see the benefits that it would bring. “Many students are already tech savvy. Incorporating digital curriculum in their education would make students more engaged and willing to learn, and provide more opportunities that the student may not always have,” stated one forum participant. Some of the opportunities that digital learning would bring to students would include virtual manufacturing facility tours, access to virtual equipment that schools do not have access to (such as industrial tools), and cost effective ways to obtain copies of text books. One educator stated that “the world is driven by technology, so it only makes sense to teach with technology.”

Unfortunately, there are always barriers to using technology in the educational system, and these educators were fully aware of this. The major concerns that they considered were a lack of technological resources in schools, school-wide bandwidth issues, and the fact that many students do not have access to the internet in their homes. Educators expressed that digital learning implementation would be difficult without having the appropriate technical materials for students first. In order to fully implement digital curriculum in the educational system, schools need the support of their administration, educators, and parents.

Lastly, in this portion of the discussion, educators conversed about how digital curriculum cannot fully replace traditional education. However digital learning can be used to compliment what is taught in the classroom and can provide opportunities for self-passed mastery of material.

Pathways

Fact or Fiction: *“The average manufacturing salary is over \$47,000 whereas the average salary for other jobs in SC is around \$35,000 annually.”*

The second Fact or Fiction statement asked educators to specifically discuss the manufacturing sector and its practicality as a career choice for students. Though this statement is a fact, people are not aware that these types of salaries are obtainable in manufacturing. Participants stated

that the manufacturing career cluster is the least chosen by students in the Pee Dee schools. This is because they are unaware of the opportunities available to them and are discouraged by the negative perceptions of manufacturing

Discussion Question: *“What kind of targeted activities would help inform students about potential career pathways in STEM and advanced manufacturing fields?”*

The second discussion question asked educators to discuss what types of events and activities could help educate students about the career opportunities available to them in the field of manufacturing. Some suggestions were to make time to get students out of the classroom and let them see the real world, through job shadowing, industry mentoring, career fairs, and vocational summer camp programs. Additionally, participants suggested bringing speakers from industry into the classroom to talk about their industry and to relate their work to what the students are learning about. Two examples of this that were discussed were Panera Bread talking to students about measurement, and a construction company teaching students about angles.

In addition to these special programs, educators believe that their curriculum should be altered to be more career and technology focused in order to help students be prepared for STEM careers. Educators suggested that elementary school students should be introduced to the variety of careers in the world outside of being a doctor or nurse, middle school career specialists should teach students the difference between the 16 career clusters, and high school students should be taught the differences between different types of STEM careers. “Many high school students think their only options are to go to college or to join the military. We need career specialists in our schools to help them see all of the opportunities available to them.”

Lastly for this discussion prompt, educators also discussed how the education system needs to move away from standardized learning and instead focus teaching students what they need to learn to advance in their future. The curriculum that is taught in schools should align more with career skills that will help the students succeed, such as soft skills, professionalism, and critical thinking skills.

Professional Development

Fact or Fiction: *“To be successful in this new manufacturing environment, STEM students must understand job options and career sustainability. Yet, traditional pedagogical tools are ill-equipped to develop this holistic view in students.”*

The third Fact or Fiction statement asked the participants to deliberate on if traditional educational methods are preparing students for highly technical careers. Most forum participants agreed that this statement is fact; the traditional education methods are not preparing students for technical careers. “Traditional educational tools are obsolete and not compatible with advanced

manufacturing skills,” stated one educator. Schools should encourage the development of soft skills and employability skills so that students are prepared when they graduate.

Discussion Question: *“Is professional development an effective solution to help prepare STEM teachers for best practices and methods to engage students in STEM technical education?”*

The third discussion question asked educators to discuss their own professional development practices and what can be done to improve the opportunities for teachers. Educators had an overwhelming consensus on the need for more technical experience for themselves. In order to be able to teach STEM principles, educators should have some experience with STEM careers themselves. Programs such as “Educators in Industry” were praised for this type of experience, and many educators hoped that these opportunities would become more prevalent in the state.

Another suggestion that participants made for improving educator professional development was to have best practices tours of schools in the state that are successful at implementing digital learning and STEM curriculum in their classrooms. This strategy is already implemented by companies who will tour their own facilities that have high efficiency and production rates. This same principle can be applied to the education system. Teachers can learn from other teachers on how to incorporate STEM with their curriculum. One educator said it was important to “show don’t just tell teachers how to integrate STEM education with the standards. Many teachers think that these are separate goals.”

Lastly, educators were critical of their own education and suggested that more technological skill and more STEM knowledge should be implemented in their own training and education. This way, teachers will have more experience with technology and can apply it in their own classrooms more easily.

Summary of Group Discussion Session



The group discussion session provided insight into the current state of STEM education in South Carolina and the perceptions of manufacturing. Educators agree that there is a negative perception of manufacturing in the eyes of both parents and students. Manufacturing is the least chosen career cluster in Pee Dee schools. In order to encourage students into these highly technical jobs, manufacturing companies must learn to “resell” these jobs, and educators must inform students of the opportunities available to them in the field of manufacturing.

Educators, counselors, and career specialists should encourage students to pursue technical careers and should allow them to see the real world of manufacturing.

CONCLUSION



The participants and organizers of the STEM Educators Forum ended the day optimistic about the possibilities for improvement in overall workforce education and preparation in South Carolina. This forum was an opportunity for educators from the Pee Dee area to give their input on STEM education and discuss the future of education and digital learning.

The forum was well received by participants and generated many great ideas on how to improve STEM education in the state. The small group discussions allowed participants to share their ideas and to hear other people's perspectives on these important issues. This event enabled important conversations between educators and local workforce development organizations in order to better the workforce of tomorrow. CA2VES and its partners plan to host more of these forums in the future with educators, industry representatives, and local legislators to discuss the challenges that face today's workforce and to plan for the future of manufacturing in South Carolina.