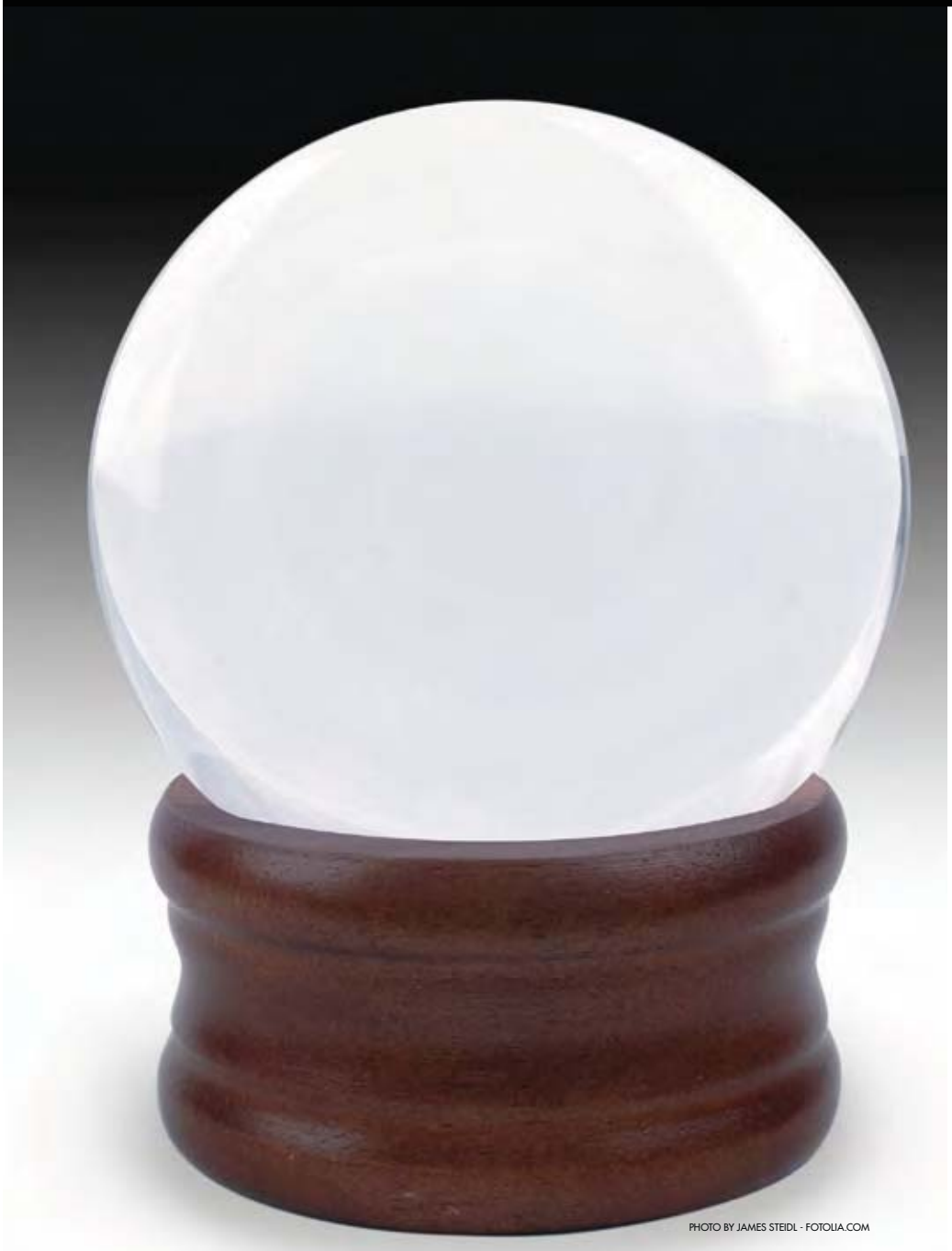
Gazing into the FUTUR



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BY SUSAN REESE

"We cannot always build the future for our youth, but we can build our youth for the future." Franklin D. Roosevelt spoke those words more than 50 years ago. It was a time when students took classes called "shop," and those students were almost exclusively boys. Home economics classes, on the other hand, were filled with girls learning cooking and sewing. Business classes often meant typing and shorthand for girls, while mostly boys learned about farming in the classes devoted to agriculture education. Extracurricular activities meant clubs such as 4-H, Future Farmers of America and Future Homemakers of America. All of these activities provided students with the skills they needed for the world in which they lived, but that world has changed, and so has the education they receive. Change was necessary so that we could continue, as Roosevelt encouraged, building our youth for the future.

Today, "vocational education" is "career and technical education," and students are learning about engineering, computers, information technology, health sciences, business and marketing, and a number of trades and industries. Future Farmers of America is now the National FFA Organization, and Future

Homemakers of America has become Family, Career, and Community Leaders of America. Neither the Career and Technical Student Organizations nor the classes are as sharply divided along gender lines as they were 50 years ago. The changes in the career and technical education (CTE) classroom have been dramatic, but what will that classroom look like 50 years from now?

Each year since 1985, the editors of *The Futurist*, which is published by the World Future Society, have selected for their "Outlook" report what they call the most thought-provoking ideas and forecasts that appeared in the magazine during the year. Number four on the *Futurist's* Outlook 2009 list is, "Careers, and the college majors for preparing for them, are becoming more specialized." Students are beginning to explore what the magazine calls "niche majors," such as sustainable business, strategic intelligence, entrepreneurship, neuroscience and nanotechnology, computer and digital forensics, and comic book art.

At number six on the list is another education-related item. "Professional knowledge will become obsolete almost as quickly as it's acquired." Rapid changes such as new technologies will mean continuous education and retraining and lead to a substantial portion of the labor force being in job retraining programs at any given time. If that prediction holds true—and it certainly seems logical—then career and technical educators are going to be very busy in the future, both teaching and learning.

Preparing for the Future Now

James Canton, author of such books as *The Extreme Future: The Top Trends That Will Reshape the World in the 21st Century* and *Technofutures: How Leading-Edge Innovations Will Transform Business in the 21st Century*, is known as a global futurist. In fact, he is the CEO and chairman of a think tank known as the Institute for Global Futures. Canton says there are things we should be doing now to be prepared for the future. One of those is rethinking education, including educating for the high-tech jobs of tomorrow, and teaching about diverse cultures and entrepreneurship, as well as building understanding about globalization and trade. "…and bringing down education costs is a good beginning," adds Canton.

Canton also believes that health care needs some 21st century transformation, and notes, "Eliminating the waste, using IT to make health care efficient and preparing for the post-genomic and personalized health care era is a good start."

Canton has a list of "The Top 10 Trends of the Extreme Future," and these include a future of energy alternatives such as hydrogen; medicine that is radically altered by nanotech, neurotech and genomics; security from threats such as terrorists and hackers; and dealing with an environment that includes global warming, pollution and threats to biodiversity. He also sees an American workforce that is becoming more multicultural—especially more Hispanic—and more female, and says that this workforce will have to "embrace innovation to become globally competitive."

Another futurist, David Zach, speaking at a Des Moines University College of Health Sciences retreat suggested that his audience consider a wristband that provides continuous monitoring of biometrics. "Would such a device, at some level automate the role of the doctor, nurse or other caregiver?" Zach asked. "And if so how would that automation change the role of caregivers?" We might add the question, "How would that change the role of those who educate the caregivers?"

Zach says that with such innovations, we must also look at implications for those who would use the information, such as health systems and insurers, because the potential is there for the information to be used against the patient as well as to benefit him or her. Health sciences education today includes teaching about ethics, and in the future that may become even more complex—and even more important.

Zach was asked about nanotechnology by the Mental Health Corporations of America in a follow-up interview to his keynote address at one of their conferences, and he said we can expect things such as "nanodoctor-type devices" that could repair broken bones or attack only

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cancer cells. He says nanotechnology is a huge advancement in our future that requires an equally huge advancement in education, and adds, "In the 21st century, you don't have the right to be uneducated. If you are not doing what you can to become better educated, you will lose the future."

"We have to get used to the future being something you didn't expect," says Zach. "And within that uncertainly lie opportunities—if you know how to look for them."

So how accurate are the predictions of those who call themselves futurists? Some of them seem to be worth listening to. Glen Hiemstra, founder and CEO of Futurist.com, was one of the speakers at the 2002 ACTE Annual Convention and Career Tech Expo where he presented a sweeping overview of the dynamics creating a revolution in technology, the economy, education and society. In 2008, Hiemstra predicted that the economic slump driven by the debt crisis would be worse than experts were suggesting at the time. Unfortunately, he proved to be correct on that count. Among Hiemstra's current predictions for the near future: more breakout activity in nanotech solar energy, continued development in mobile Internet, and growth in touch- and gesture-based interfaces.

Solving Today's Problems Tomorrow

Education, health care reform and the energy crises were key issues in President Obama's campaign platform, and we know he will need help from CTE to help solve them. As health care goes electronic, it will require more skilled and well trained information technology specialists, medical technicians, nurses, and medical records technicians, among others.

New and old energy sources are being tapped, and more career and technical programs in solar power and wind power are emerging. Ethanol plants are being built, and nuclear power plants are again being considered. Their construction will require skilled workers such as plumbers, pipe fitters and welders, as well as the technically trained workers needed to operate them when they open. Even geothermal energy is growing, according to a recent report from the Geothermal Energy Association, which noted that the number of new geothermal projects has risen 25 percent since last August alone.

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Biofuels have certainly become a hot topic, and agriculture education may include not just the growing of food crops but sources of fuel as well. Biodiesel processed from vegetable and animal fats is already being used, with the side benefit of recycling waste products. Corn-based ethanol and hydrogen are already powering some cars. Will electric cars be the future? Companies such as Zap! and Tesla Motors hope so.

A recent article on MSN.com noted that Honda is making a push for natural gas-powered cars with its Civic GX. The future automotive technology class could be quite interesting and varied if vehicles are powered by more than one of these sources, and they are likely to be even more necessary if our vehicles continue to grow more complex. While ethanol has been in the forefront of the biofuels movement, other sources are being explored. For example, an article in *Virginia Tech Magazine* notes, "Although food-crop residue has the potential to produce a considerable amount of biomass for fuel, much of the research at Virginia Tech and around the world is on alternative sources of biomass, such as switchgrass."

Several projects at Virginia Tech are comparing switchgrass to other possible biomass sources. The switchgrass research at Virginia Tech has focused on traditional questions of agronomy, but it also includes newer issues such as the application of biotechnology and genomics. Woody plants such as poplars are also being explored as options at places such as Virginia Tech.

According to the article, Jeff Waldon, executive director of the Conservation Management Institute at Virginia Tech, has been investigating the possibility of paying Virginia farmers for switchgrass that could be burned in the same combustion unit as coal to generate electricity, a process known as co-firing, and he says, "If this new co-firing idea takes hold, a large, new, stable market for an agricultural crop could change the landscape of farming."

The University of Nebraska Department of Agriculture is among the other schools that have done research on the development of switchgrass into a biomass fuel crop, and the University of Iowa Extension Service has issued a management guide for the production of switchgrass for biomass fuel in Southern Iowa. And that's just an example of one possible fuel crop for the future. Surely others will emerge as researchers and agriculture experts continue to explore options.

CTE for the 21st Century

Joseph Scarcella, a professor of education and M.A. program coordinator for the CTE Teacher Education Program at

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California State University, San Bernardino, believes that with greater technological advances, the influence of CTE throughout education will become more profound and will require even more connection between academics and CTE. "As technology evolves, our society is going to become so complex that we will have to have some form of CTE imbedded in all of our education," he adds.

Scarcella, who is also a past vice president of ACTE's Technology Education Division, describes technology education and CTE as "high-spirited disciplines" and says, "As in their history, these disciplines' reputations will become center stage, recognized by the majority as the educational delivery system/mechanism to meet the needs for lifelong learning, career exploration and workforce development for all."

Bob Putnam, the current ACTE Engineering and Technology Division vice president, projects that, "In the future, disciplinary divisions, or silos, will be largely reduced or even eliminated, and students will study language arts, mathematics and technology as a seamless area of study. The engineering technologist of the future will be truly interdisciplinary."

Jim Comer, ACTE Adult Workforce Development Division vice president, says, "What I see for the future is that the speed of change is going to increase, but we will also see more transfer of skills across disciplines and across areas that we never dreamed of. For example, someone with health care skills may transition into another area such as manufacturing. There will be even more virtual training, and it will be practically around the clock, with people practicing simulations in their homes."

As changes in technology become even more rapid, Comer says it will require career and technical educators to work with people in one classroom who may range in age from 18 to 68 years of age. "We will often be working outside of the framework we have today," he adds.

ACTE Health Sciences Education Division Vice President Ruth Ann Eckenstein says that health care will change drastically over the next 50 years, and she is sharing a vision of the future with her students through the Discovery Channel's series of videos on the year 2057. One of

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IMAGINATION

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the videos is on a "medical smart suit" that contains dozens of computer chips and sensors to monitor the wearer's health so that in the future it will be possible to have "a doctor in your clothing."

"If health care changes, the health care provider education must change drastically as well," says Eckenstein. Her predictions: "Traditional buildings, classrooms and the instructor standing in front of a classroom of students will not be accepted as a method of learning for the student. The instructor will become an education coach, and brick and mortar will change into gathering spaces for consultations between an education coach and the student."

Eckenstein thinks that in the future, clinical experiences could be facilitated by clinical coaches who are stationed in the work area and are assigned patients for educational activity on dedicated educational units. In this scenario, she says, "The patient is assigned to a multidiscipline team, and the clinical coach and student/s are members of the team. The student has access to all team members for support during the learning experiences. The clinical learning takes on the real-world experiences with many professionals involved in the educational experience, not just the clinical instructor providing guidance to the student."

In areas of CTE such as technology education and health sciences education, it is not hard to see that there will be a great many changes over the next 50 years, just as there have been many over the past 50 years. In others, change may not be as drastic. For example, the things that are taught in family and consumer sciences education are universal and timeless—becoming a responsible member of a family and a community.

While the devices used in the kitchen may change, the fundamentals needed to become a good mother, a good father and a good citizen will not. And yet when new challenges arise in our society, family and consumer sciences education has been there to tackle them—whether that means teaching financial responsibility, dealing with bullying and other forms of violence, or confronting our current obesity epidemic. The future will doubtless have new challenges to face—and it will need family and consumer sciences education to help young people face them.

"Family and consumer sciences education is in a position to tackle social issues, and we're able to adapt our curriculum to these issues as they become apparent," says Becky Cox, vice president of ACTE's Family and Consumer Sciences Education Division. "What we teach is really about life and living."

Innovative teachers in all areas of CTE tend to adopt new technologies and find

ways to use them in their classrooms. Deb Moore, the current vice president of ACTE's Marketing Education Division, says, "So many cell phones now have technology that is not present in the classroom. I would love to have cell phones take on a greater role in the classroom." Moore also likes to send video links to her students during the summer to keep them connected with her and with their marketing content. The videos are about entrepreneurship, ad campaigns or other current events that she thinks will engage them.

Just Imagine

So where are the flying cars? Why can't Scotty beam us up yet? Imagining the future is not an exact science, and some things turn out differently than we expected. For example, we still don't have those fantastic moving superhighways that transport cars around the country. But what we do have is a fantastic superhighway that moves information around the globe at incredible speed, and that is amazing in its own right. A car that transforms into a plane recently made a successful flight, but at close to $200,000 in cost, the sky probably won't be filled with them anytime too soon.

The Jetsons' Rosie the robot hasn't arrived yet, but the Roomba has, and so have robots on assembly lines and in operating rooms. And while robots could probably take over the jobs of cosmetologists someday, that is one of those things that are hard to imagine because the element of creativity and the need for human interaction are such integral parts of the services provided by cosmetologists. Could a robot replace a skilled and creative chef someday? Perhaps, but there is a reason they call it culinary "arts," and it may be a long time before a robot would have the flair, creativity—and on occasion the adventurousness—that make a great chef.

Imagination is a wonderful human quality, and it has given us great works of art and great technological inventions. As the American electrical engineer and inventor Charles Kettering noted, "Our imagination is the only limit to what we can hope to have in the future." Who knows what is being imagined at this very moment or what will be created in the years to come? Some of the seeds of those ideas are being planted and nurtured in today's CTE classrooms and will grow into tomorrow's innovative tools, technologies and services. And while we don't know yet exactly what the future will be, we can be certain that in the career tech classroom 50 years from now, educators will be preparing their students for whatever it may hold. T

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