• CEFPI is a Registered Provider with The American Institute of Architects Continuing Education System (AIA/CES). Credit(s) earned on completion of this course will be reported to AIA/CES for AIA members.

• The programs presented at this conference are registered with AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

• Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.
Julie Walleisa, AIA, LEED AP, CEFP

- Architect and Certified Educational Facility Planner
- Principal at Dekker/Perich/Sabatini
- Specialize in early childhood, K-12, and higher education design
- Programmed and designed career-focused spaces
Benjamin Gardner, AIA, LEED AP

- Architect and Principal at Dekker/Perich/Sabatini
- Background in architecture, construction, and construction management
- Specialize in K-12 design
- CEFPI New Mexico Chapter President
Shannon Parks

- Architect at Dekker/Perich/Sabatini
- Specialize in K-12 design
- CEFPI New Mexico Chapter Board Member
ACE Academy Portland

• Mark Clifford, Director

• High School Juniors and Seniors
• Engineering and Architecture programs
Today’s Workshop

How can we transform our approach to career/vocational education spaces, to better prepare students for today’s careers, and the requirements of tomorrow’s careers that are not yet fully defined?
Today’s Workshop

What spaces and resources are needed to prepare students for creative, service, and other complex careers, compared to the industrial careers of the past?
Today’s Workshop

Goal: Create a vision of vocational education in 2025, including consideration of instructional needs and physical environments.

20 min Intro presentation
45 min Exercise #1
45 min Exercise #2
45 min Group presentations
5 min Closing
Learning Objectives

• Describe current issues and trends in vocational education

• Define their own vision of vocational education in 2025

• Compare conflicting concepts of future vocational needs, and the school’s role in bridging the gap between high school and college/career

• Apply this vision to inform planning and design decisions relating to current or future vocational education spaces
## Evolution

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Era</strong></td>
<td>Mass Production, Automation</td>
<td>Atomic Age</td>
<td>Miniaturization</td>
<td>Digital/Information Age</td>
<td>Conceptual/Creative/Collaboration Age?</td>
</tr>
<tr>
<td><strong>Degrees</strong></td>
<td>3%</td>
<td>11%</td>
<td>24%</td>
<td>29%</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Goals</strong></td>
<td>Apprenticeship/Job Placement</td>
<td>Multiple Opportunities</td>
<td>Multiple Opportunities</td>
<td>Multiple Opportunities</td>
<td>Multiple Opportunities</td>
</tr>
<tr>
<td><strong>Focus</strong></td>
<td>Career-Specific Skills</td>
<td>Generic/Transferable Skills</td>
<td>Generic/Transferable Skills</td>
<td>Generic/Transferable Skills</td>
<td>Generic/Transferable Skills</td>
</tr>
</tbody>
</table>
The ever-popular myth of the hard worker who can’t read well or divide fractions but owns his own air-conditioning repair company is just that—a myth.

Ross Wiener, The Education Trust

*How the Federal Government Could Promote Academically Rigorous Career and Technical Education*
Evolution
Evolution: Automotive

Manual Training lab works on an automobile frame, 1918

Automotive mechanics, 1960s

Images courtesy of The Ohio State University and the VIU Archives
Evolution: Automotive

http://www.csmonitor.com/Innovation/Tech/2010/0524/West-Philadelphia-high-school-dares-to-build-a-100-m.p.g.-car
http://live.gfalls.wednet.edu/ecoteams/
...the mission of CTE will have to change... The goal of CTE 2.0 should be that students earn a postsecondary credential or an industry-recognized certification ... a career-ready student must also have... critical thinking and problem-solving skills, an ability to synthesize information, solid communication skills, and the ability to work well on a team.

Arne Duncan, U.S. Secretary of Education
21st Century Survival Skills

- Critical Thinking and Problem Solving
- Collaboration across Networks and Leading by Influence
- Agility and Adaptability
- Initiative and Entrepreneurialism
- Effective Oral and Written Communication
- Accessing and Analyzing Information
- Curiosity and Imagination

Perhaps CTE’s greatest contribution has been to make education relevant and keep students motivated and engaged in learning.

Betsy Brand, Director, American Youth Policy Forum

What a 21st Century Career and Technical Education System Could Look Like
Varied Programs

Association for Career and Technical Education, https://www.acteonline.org/cte/#.VCwwUGdMvcs
## Varied Programs

<table>
<thead>
<tr>
<th>Biological Lab Technician</th>
<th>Long Term Care Nursing Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Sonographer</td>
<td>Massage Therapist</td>
</tr>
<tr>
<td>Electrocardiograph Technician</td>
<td>Medication Aide</td>
</tr>
<tr>
<td>MRI Technician</td>
<td>Medical Assistant</td>
</tr>
<tr>
<td>Phlebotomist</td>
<td>Occupational Therapy Aide/Assistant</td>
</tr>
<tr>
<td>Radiologic Technologist, Aide</td>
<td>Prosthetic/ Orthotics Technician</td>
</tr>
<tr>
<td>Direct Care Aide</td>
<td>Physical Therapy Aide</td>
</tr>
<tr>
<td>Acute Care Nursing Assistant</td>
<td>Physical Therapy Assistant</td>
</tr>
<tr>
<td>Chiropractic Assistant</td>
<td>Restorative Aide</td>
</tr>
<tr>
<td>Basic Medical Assistant</td>
<td>Student Athletic Training Aide</td>
</tr>
<tr>
<td>Dental Assistant, Hygienist</td>
<td>Surgical Technologist</td>
</tr>
<tr>
<td>Dental Laboratory Technician</td>
<td>Veterinary Assistant</td>
</tr>
<tr>
<td>Emergency Medical Technician</td>
<td>Vision Care Technician, Assistant</td>
</tr>
<tr>
<td>Feeding Assistant</td>
<td>Respiratory Therapist</td>
</tr>
<tr>
<td>Fitness Specialist</td>
<td>Pharmacy Technician, Aide</td>
</tr>
<tr>
<td>Home Health Care Assistant</td>
<td>Medical Office Specialist</td>
</tr>
</tbody>
</table>
Varied Programs

http://schools.olatheschools.com
Focused Programs

http://www.acecharterschool.org/
Focused Programs

AVIATION HIGH SCHOOL
The Premier Career and Technical School of New York City!

Aviation Maintenance Technology

The Aviation industry offers a multitude of dynamic and lucrative careers for people who have the required academic and technical background. Every commercial, private, or military aircraft requires the careful attention of a professional maintenance specialist. This individual must be certified and licensed by the Federal Aviation Administration (FAA). Typically, entry level salaries for such positions range from between $50,000 to $60,000 annually. Our Aviation Maintenance Technology program will provide students with the knowledge, skills and certification required by the FAA.

The program is comprised of 1900 hours of instruction. Upon completion of the curriculum, written, oral and practical examinations, students will earn FAA airframe and/or powerplant certification ready for employment. From propeller aircraft to the space shuttle, our graduates design, fly and maintain them. Our mission is to provide our nation with qualified young professionals necessary to control the present and influence the future of the aerospace industry.

To learn more about our curriculum please click on the license area below:

Airframe
Powerplant
FAA Testing

http://www.aviationhs.net/
Focused Programs

CAREER AND TECHNICAL EDUCATION COURSEWORK

As sophomores, students enroll in one of six career and technical education (CTE) programs of study, which leads to industry certification in marine science or technology and includes a continuum of work-based learning experiences that extend student learning from the school classroom into a real-world, work-related context.

Aquaculture                      Marine Biology Research                      Marine Systems Technology                      Ocean Engineering
Scientific Diving                Vessel Operations                           Harbor Class
Predicting the Future

65% of grade school kids are going to have a job that hasn’t been invented yet.

Gavin Newsom, Lt Governor of California
September 9, 2013
Predicting the Future

Cryogenics laboratory assistant  Remote-nursing technician
Laser beam operator  Sports engineer
Holograph designer  Biological historian
Mutation expert  Software coding experts
Artificial intelligence scientist  Charged-couple device technician
Genetic engineering salesperson  Abstract writer
Space traffic control officer  Space shuttle repairperson
Aerospace designer  Magnetic train developer
Simulations specialist  Industry control center technician
Clone doctor and clone nurse  Automatic drafting programmer
Teleconferencing coordinator  Robot retrainer
Automatic factory security  Video systems engineer
Organic computer engineer  Microwave marketer
Hybrid airship operator  Computer art specialist
Debugging specialist  Automatic tunneling expert
Digitizer technician  Deep-well explorer
Maser specialist  Submersible crew
Silicon mining expert  Underwater archeologist
**Space geographer**  Bio-farming expert
Fiber optics technician  Organ replacement surgeon
Voice-activated computer repairperson  Sonar applications salesperson
Computer museum director  Bullet train manager
Technology transfer monitor  Materials recycling technician
Speech compression technology engineer

http://paleofuture.gizmodo.com/47-futuristic-jobs-you-were-supposed-to-have-by-now-1296120343
Predicting the Future

Medical:
- Cryogenics laboratory assistant
- Mutation expert
- Genetic engineering salesperson
- Clone doctor and clone nurse
- Remote-nursing technician
- Organ replacement surgeon

Technology:
- Artificial intelligence scientist
- Organic computer engineer
- Debugging specialist
- Digitizer technician
- Software coding experts
- Voice-activated computer repairperson

Design/Graphics:
- Holograph designer
- Aerospace designer
- Simulations specialist
- Computer art specialist
- Automatic drafting programmer

Business:
- Teleconferencing coordinator

Natural Resources:
- Deep-well explorer
- Bio-farming expert
- Materials recycling technician
- Silicon mining expert
- Biological historian
- Space geographer

Transportation:
- Space traffic control officer
- Hybrid airship operator
- Bullet train manager
- Magnetic train developer
- Space shuttle repairperson
Predicting the Future

- Carbon Capture Technician
- Mining Resource Specialist
- Aquaponic Fish Farmer
- Biofilm Installer
- Urban Farmer
- Health Care Navigator
- Robot Counselor
- Makeshift Structure Engineer

Canadian Scholarship Trust, http://careers2030.cst.org/jobs
Predicting the Future

Table 1.3: Fastest growing occupations, 2012 and projected 2022
(Numbers in thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal care aides</td>
<td>1,190.6</td>
<td>1,771.4</td>
<td>580.8</td>
<td>48.8</td>
<td>$19,910</td>
</tr>
<tr>
<td>Home health aides</td>
<td>875.1</td>
<td>1,299.3</td>
<td>424.2</td>
<td>48.5</td>
<td>$20,820</td>
</tr>
<tr>
<td>Interpreters and translators</td>
<td>63.6</td>
<td>92.9</td>
<td>29.3</td>
<td>46.1</td>
<td>$45,430</td>
</tr>
<tr>
<td>Diagnostic medical sonographers</td>
<td>58.8</td>
<td>85.9</td>
<td>27.0</td>
<td>46.0</td>
<td>$65,860</td>
</tr>
<tr>
<td>Physical therapist assistants</td>
<td>71.4</td>
<td>100.7</td>
<td>29.3</td>
<td>41.0</td>
<td>$52,160</td>
</tr>
<tr>
<td>Physical therapist aides</td>
<td>50.0</td>
<td>70.1</td>
<td>20.1</td>
<td>40.1</td>
<td>$23,880</td>
</tr>
<tr>
<td>Skincare specialists</td>
<td>44.4</td>
<td>62.0</td>
<td>17.7</td>
<td>39.8</td>
<td>$28,640</td>
</tr>
<tr>
<td>Physician assistants</td>
<td>86.7</td>
<td>120.0</td>
<td>33.3</td>
<td>38.4</td>
<td>$90,930</td>
</tr>
<tr>
<td>Helpers--electricians</td>
<td>60.8</td>
<td>83.3</td>
<td>22.4</td>
<td>36.9</td>
<td>$27,670</td>
</tr>
<tr>
<td>Information security analysts</td>
<td>75.1</td>
<td>102.5</td>
<td>27.4</td>
<td>36.5</td>
<td>$86,170</td>
</tr>
<tr>
<td>Health specialties teachers, postsecondary</td>
<td>190.0</td>
<td>258.6</td>
<td>68.6</td>
<td>36.1</td>
<td>$81,140</td>
</tr>
<tr>
<td>Medical secretaries</td>
<td>525.6</td>
<td>714.9</td>
<td>189.2</td>
<td>36.0</td>
<td>$31,350</td>
</tr>
<tr>
<td>Physical therapists</td>
<td>204.2</td>
<td>277.7</td>
<td>73.5</td>
<td>36.0</td>
<td>$79,860</td>
</tr>
<tr>
<td>Brickmasons and blockmasons</td>
<td>71.0</td>
<td>96.2</td>
<td>25.2</td>
<td>35.5</td>
<td>$46,440</td>
</tr>
<tr>
<td>Nursing instructors and teachers, postsecondary</td>
<td>67.8</td>
<td>91.8</td>
<td>24.0</td>
<td>35.4</td>
<td>$64,850</td>
</tr>
<tr>
<td>Nurse practitioners</td>
<td>110.2</td>
<td>147.3</td>
<td>37.1</td>
<td>33.7</td>
<td>$89,960</td>
</tr>
<tr>
<td>Dental hygienists</td>
<td>192.8</td>
<td>256.9</td>
<td>64.2</td>
<td>33.3</td>
<td>$70,210</td>
</tr>
<tr>
<td>Meeting, convention, and event planners</td>
<td>94.2</td>
<td>125.4</td>
<td>31.3</td>
<td>33.2</td>
<td>$45,810</td>
</tr>
<tr>
<td>Market research analysts and marketing specialists</td>
<td>415.7</td>
<td>547.2</td>
<td>131.5</td>
<td>31.6</td>
<td>$60,300</td>
</tr>
<tr>
<td>Substance abuse and behavioral disorder counselors</td>
<td>89.6</td>
<td>117.7</td>
<td>28.2</td>
<td>31.4</td>
<td>$38,520</td>
</tr>
</tbody>
</table>

### Table 1.5: Fastest declining occupations, 2012 and projected 2022
(Numbers in thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Postal service clerks</td>
<td>66.9</td>
<td>45.7</td>
<td>-21.3</td>
<td>-31.8</td>
</tr>
<tr>
<td>Postal service mail sorters, processors, and processing machine operators</td>
<td>129.6</td>
<td>91.0</td>
<td>-38.6</td>
<td>-29.8</td>
</tr>
<tr>
<td>Semiconductor processors</td>
<td>21.3</td>
<td>15.5</td>
<td>-5.8</td>
<td>-27.1</td>
</tr>
<tr>
<td>Textile cutting machine setters, operators, and tenders</td>
<td>15.5</td>
<td>11.3</td>
<td>-4.2</td>
<td>-27.1</td>
</tr>
<tr>
<td>Postal service mail carriers</td>
<td>295.1</td>
<td>215.8</td>
<td>-79.2</td>
<td>-26.8</td>
</tr>
<tr>
<td>Sewing machine operators</td>
<td>161.4</td>
<td>119.7</td>
<td>-41.7</td>
<td>-25.8</td>
</tr>
<tr>
<td>Word processors and typists</td>
<td>104.4</td>
<td>78.2</td>
<td>-26.2</td>
<td>-25.1</td>
</tr>
<tr>
<td>Data entry keyers</td>
<td>220.3</td>
<td>166.1</td>
<td>-54.2</td>
<td>-24.6</td>
</tr>
<tr>
<td>Textile knitting and weaving machine setters, operators, and tenders</td>
<td>21.9</td>
<td>16.5</td>
<td>-5.4</td>
<td>-24.5</td>
</tr>
<tr>
<td>Postmasters and mail superintendents</td>
<td>23.0</td>
<td>17.4</td>
<td>-5.6</td>
<td>-24.2</td>
</tr>
<tr>
<td>Drilling and boring machine tool setters, operators, and tenders, metal and plastic</td>
<td>20.9</td>
<td>16.2</td>
<td>-4.7</td>
<td>-22.5</td>
</tr>
<tr>
<td>Textile winding, twisting, and drawing out machine setters, operators, and tenders</td>
<td>27.5</td>
<td>21.8</td>
<td>-5.6</td>
<td>-20.5</td>
</tr>
<tr>
<td>Farmers, ranchers, and other agricultural managers</td>
<td>930.6</td>
<td>750.7</td>
<td>-179.9</td>
<td>-19.3</td>
</tr>
<tr>
<td>Meter readers, utilities</td>
<td>40.2</td>
<td>32.5</td>
<td>-7.7</td>
<td>-19.2</td>
</tr>
<tr>
<td>Computer operators</td>
<td>74.6</td>
<td>62.0</td>
<td>-12.7</td>
<td>-17.0</td>
</tr>
<tr>
<td>Foundry mold and coremakers</td>
<td>12.4</td>
<td>10.4</td>
<td>-2.0</td>
<td>-16.2</td>
</tr>
<tr>
<td>Extruding and drawing machine setters, operators, and tenders, metal and plastic</td>
<td>74.9</td>
<td>63.0</td>
<td>-11.9</td>
<td>-15.9</td>
</tr>
<tr>
<td>Cutters and trimmers, hand</td>
<td>14.2</td>
<td>12.1</td>
<td>-2.2</td>
<td>-15.3</td>
</tr>
</tbody>
</table>

Predicting the Future
Predicting the Future

The future of work
A journey to 2022

10,000 people in China, India, Germany, the UK and the US give their views on the future of work and what it means for them.

66% see the future of work as a world full of possibility and believe they will be successful.

53% think technological breakthroughs will transform the way people work over the next 5-10 years.

Predicting the Future

There will be a major shift away from the thinking that we learn one profession, have one job and stay in it for decades.

Crowded urban centres will necessitate ‘anywhere working’ aided by technology.

The need for economic and environmental efficiency [will have the single biggest impact on the way we work over the next ten years]

Contract employment will be king. Full-time jobs will become obsolete.

Greater emphasis on work – life balance – more employees wanting work that fits around their life rather than focusing on a specific career path [will have the single biggest impact on the way we work over the next ten years]

2 out of 5

People around the world believe that traditional employment won’t be around in the future. Instead, people will have their own ‘brands’ and sell their skills to those who need them.

Predicting the Future

Proficiencies and abilities required across different jobs and work settings.

Predicting the Future

Sense-making: ability to determine the deeper meaning or significance of what is being expressed

Social intelligence: ability to connect to others in a deep and direct way, to sense and stimulate reactions and desired interactions

Novel & adaptive thinking: proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule-based

Cross-cultural competency: ability to operate in different cultural settings

Predicting the Future

**Computational thinking:** ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning

**New-media literacy:** ability to critically assess and develop content that uses new media forms, and to leverage these media for persuasive communication

**Transdisciplinarity:** literacy in and ability to understand concepts across multiple disciplines

**Design mindset:** ability to represent and develop tasks and work processes for desired outcomes

Predicting the Future

Cognitive load management: *ability to discriminate and filter information for importance, and to understand how to maximize cognitive functioning using a variety of tools and techniques*

Virtual collaboration: *ability to work productively, drive engagement, and demonstrate presence as a member of a virtual team.*
The Tough Question

If exact jobs are hard to predict, and we believe students will likely have multiple jobs/careers over a lifetime, how can future CTE programs create lifelong learners with a head start on key skills?
The Future of Career/Vocational Education:
Group Exercise #1
Group Exercise #1: 45 minutes

Reverse Brainstorming Example:

a. Real question - How to stop people from speeding on the roads
   a. More cops, higher penalties, timed lights, etc.

b. Flip it – How to get people to speed on the roads
   a. Flat, wide roads in great condition, racecar training, signs you can read while whizzing by, etc.
Group Exercise #1

Reverse Brainstorming:

a. Generate a list from your flipped example

b. Reverse the list into solution ideas for the original question

c. Evaluate these ideas – which are potential solutions, or attributes of a potential solution?
Group Exercise #1

1. Select a broad career field:
   a. Medical
   b. Culinary
   c. Fabrication/Engineering
   d. Business
   e. Agriculture
   f. Other (need 5 people to work with you)
2. Reverse Brainstorming:

a. Original question - How can CTE programs in x (chosen field) create valuable lifelong learners with a head start on key future skills?

b. Flip it – How can CTE programs in x completely fail to prepare students for the future skills and careers they need?
Group Exercise #1

• 5 minutes: Pick career and scribe

• 20 minutes: Generate list for flipped question
  • How can CTE programs in \( x \) completely fail to prepare students for the future skills and careers they need?
Group Exercise #1

• Last 20 minutes: Reverse list into solutions for the original question, narrow down to 3-5 most compelling
• How can CTE programs in x create valuable lifelong learners with a head start on key future skills?
The Future of Career/Vocational Education:

Group Exercise #2
Group Exercise #2: 45 minutes

1. Building on Exercise #1, consider:
   • What will this require spatially?
   • (Type of space, space use, relationship to other things, technology, furniture, etc.)
   • How is this different from current practice?

   • 20 minutes: Generate design ideas/questions, start fleshing out your main ideas
Group Exercise #2

2. Illustrate key design drivers: Use words, collage, drawings, digital media, etc. to represent your main design ideas.

20 minutes: Create a physical or digital representation that communicates your key ideas and how it is different from current practice
Group Exercise #2

3. Pick 1-2 spokespeople to do a 5 minute presentation

5 minutes: Organize your presentation, which should cover all key elements of your thinking and design in 5 minutes
The Future of Career/Vocational Education:

Group Presentations
Group Presentations

• 5 minutes per group
  – What field did you choose?
  – What were your main ideas for how to create valuable lifelong learners with a head start on key future skills?
  – What will be required spatially to teach these skills? (design drivers, your concept)
  – How is this different from what is being done now?
The Future of Career/Vocational Education: Wrap-up
Thank you!

Dekker/Perich/Sabatini
www.dpsdesign.org

ACE Academy
http://www.acecharterschool.org/

Julie Walleisa juliew@dpsdesign.org
Benjamin Gardner benjaming@dpsdesign.org
Shannon Parks shannonp@dpsdesign.org

All info will be posted online at
http://www.dpsdesign.org/how-we-work/knowledge-center