

- Rank in importance the knowledge and skills needed for the various career pathways in which they employ, supervise, or work;
- Identify any gaps or emerging areas that are essential to the pathway and need to be addressed by career education;
- Indicate whether they work in business/industry, for a state or federal agency, in education, an association, or other;
- Provide any additional comments or information they may like to share to help improve the quality of workers they receive; and
- Possibly volunteer to participate in future surveys and/or to serve on a statewide or local industry advisory council.

Results of the 16 career cluster surveys of Missouri industry and business are available for viewing and printing at http://www.dese.mo.gov/divcareered/career_clusters.htm

Industry Advisory Councils Convened

The department career cluster leaders invited industry representatives to participate in a face-to-face meeting held in Jefferson City on January 25, 2007. At least one representative for each career pathway within each career cluster were identified and invited to participate. Following a morning introductory session by Dr. Ann Benson, consultant, more than 80 business and industry representatives reviewed the academic and technical skills needed by students in the workplace after considering feedback from the statewide survey. They responded to the following questions:

Foundation Knowledge and Skills:

- Which do we not need in Missouri?
- Which knowledge and skills are missing?
- Which grade level should each be taught?

Pathway Knowledge and Skills:

- Which do we not need in Missouri?
- Which knowledge and skills are missing?
- Which grade level should each be taught?

Credentials/Certifications:

- What are the major certifications/credentials that we might work toward?
- Verify and rank current industry credentials
- Explore any new or emerging credentials
- Consider how non-credentialed fields of study should be credentialed in Missouri

Closing Questions:

- What advice or insight would you give to a student considering a career in your industry?
- How can education and industry partner to better prepare Missouri students for this industry?
- What are the strengths of your industry?
- What are the challenges facing your industry?
- What trends are emerging in this industry?

The following pages contain summaries of the discussion and feedback collected during the January 25 Industry Advisory Council meeting in Jefferson City, Missouri. This input from industry will be important as educators review knowledge and skills statements, align courses, and develop programs of study that will prepare students with the knowledge and skills needed for successful careers.



Law, Public Safety, Corrections and Security

In attendance were Jerry Blomberg, Jefferson City Fire Department; Jason Pace, Missouri State Highway Patrol; Larae Watkins, Missouri Center for Career Education, University of Central Missouri; and Kyle Heislen, DESE.

Correction Services

- Add Continuing Education- See Page 7 of Correction Services
- Minimum Requirements
 - 21 years old
 - 60 College hours
 - Or 2 years police experience
 - 2 years military experience
 - NO felony convictions or crimes involving aggression
 - No tattoos

Recommendations

- Be of good character
- Even financial background
- CDL
- EMT 1st year
- Fire Fighter 1 and 2

Fire

Almost all hired get credentialed after employment.
They are paid to go through credentialing.

Advanced:

- Arson investigator
- Code enforcement
- Safety inspection
- Emergency management
- Loss prevention

Certifications under development

- Fire officer development (not recognized by state)

Law Enforcement

In house training for Patrol
600 hour course (paid on your own)

Advanced:

- Polygraph
- Accident reconstruction
- Pilot

Certifications under development

- FBI Academy
- Commercial Enforcement Division
- Homeland Security



What advice would you give to a student considering a career in your industry?

- Good decisions
- Good moral character
- Ability to make good decisions
- Continue to learn and research
- Continue and prepare education
- Physical activity
- Broad knowledge of physics, chemistry, math and constitution

How can educators and industry partner to better prepare Missouri students for this industry?

- Show practical application to their future
- Exposure to all different careers
- Job shadowing
- Career fairs



Manufacturing

In attendance were Bruce Bird, Carpenters Training Center; Paul boatman, Fasco Motor Group; bill Crowell, Wire Rope Corp.; Harold Fear, GE Transportation global Signaling; Mark Freeback, Swisher Mower & Machine Co.; Tom Gordon, Missouri Enterprise; Holly Hawkins, Wren; Dan Kees, Regal Beloit; John Linderman, General Mills; Gary Marble, Associated Industries of Missouri; Bill Moore, 3M Electronic Solutions Division; Jeanette Porter, Quaker Oats; Brad Smith, GE Transportation; Gene Robertson, Quaker; Randy Snyder, Wire Rope Corp.; Scott Swope, ConAgra; Bob Wasson, Gardner Denver; and Ken Kerns, DESE.

Foundation Knowledge and Skills

The industry advisory council said that they found a few modifications or clarifications to the existing foundation knowledge and skills, but affirmed that many of the current knowledge and skills were important. The council made detailed recommendations on their response forms that will be compiled.

Pathway Knowledge and Skills

Production

- The Production committee agreed with most of the existing knowledge and skills.

Recommendations of knowledge and skills that might not be necessary:

- Production workers might not need to know grammar, etc.

Recommendations for additional knowledge and skills:

- The committee felt it was necessary to ensure that people can match themselves to appropriate jobs.
- Use technology to find info rather than actually knowing info because it changes so quickly.
- Understanding of how machines work.
- Responsibility – employees need to understand their obligations as an employee – punctuality, work ethic.
- Understand job measurement – why does it matter if the line goes down? How does it effect the company and employees?
- Concept of preventive maintenance
- Process improvement – troubleshooting, innovation to improve production
- Engineers and management should also be engaged in process improvement.

Process Development

Recommendations for modifications to knowledge and skills.

- 10.1 – change to meet or exceed expectations
- 10.2 – understand current processes (old and new)
- 10.4 – change implement to utilize and add tools
- 10.5 – change to business and customer requirements
- 10.7 – change needs to expectations to show voice of customer

Recommendations for additional knowledge and skills:

- Understand processes, and ability to map a process (fabricate, welding processes, molded parts, castings)

Maintenance

- Committee feels that the survey was very well constructed and covered a breadth of knowledge required for the positions.



Recommendations of knowledge and skills that might not be necessary:

- Committee feels some of the foundation information wouldn't be necessary for maintenance technicians, such as Access, Word, Excel (non-process related computer skills) or presentation delivery skills

Recommendations for additional knowledge and skills:

- Need more specific information related to mechanical, electrical drawings, blueprints, piping and instrumentation drawings/diagrams and ladder logic. They need to be able to use this information already walking on to the job.

Quality

Recommendations of knowledge and skills that might not be necessary:

- Did not feel that database application is necessary in this career field. Only a very few of the students will really need them. People should know how to use spreadsheets, because it's such a basic tool that is used in most every manufacturing job. You would prefer to have your IT group build the database.

Recommendations for additional knowledge and skills:

- Communications K&S – should be more than one-way communication. Learning the ability to solicit feedback information from the presentation.
- Topic Systems – demonstrate continuous improvement rather than performance measures.
- Technology Information Applications – using e-mail applications, internet applications, writing applications – should be appropriate and effective use. Employers want to let employees know that reading chain letters, etc. is not permissible.
- Technical Skills – (not on survey) – algebra, geometry, trigonometry, physics, chemistry, biology – basics. Looking at the workforce of the future, not just today
- Work Teams – Coordinate work teams to produce quality product. Emphasize on quality as well as productivity.
- Ensure materials meet quality specifications – knowledge of statistical tools. Process mapping. Quality systems. All of these items would be very valuable to the workforce and quality management field.
- Quality has changed dramatically in the past 15 years. Written toward product quality --- rather than vendor expectations, inputs into the process. Learning how to set up quality processes – more comprehensive than just product focused. Looking at the entire process – not just company production.

Credentials/Certifications

What are the major certifications/credentials that we might work toward?

- Apecs – Material Controls. It's usually post-high school.
- Health and Safety is becoming a big issue. Certified industrial hygienist.
- Get the fundamental skills. They want students to know algebra, trig, and then can apply those skills. I wouldn't be in favor of spending a lot of time credentialing students coming out of high school, but we need the fundamental skills. This can be taken into account by high school graduation. High school students aren't being required to perform. They're either being passed over or passed through. A lot of this also rests with the parents, not the school districts. They need to read, write, do basic math or they don't graduate.
- I think the career path is a tremendous subject because they can see the exciting places they can go. Manufacturing: It's not just where you end up. As a ninth grader, I would have loved to look at a career path and look at the opportunities. Manufacturing also needs customer service – there are so many different careers within manufacturing, it's not just geared to one field. There's a lot of explanation that can be done. It's a vertically integrated operations. They really are different than what they are 20 years ago. International interest.
- Offering some type of certificate within the clusters. Like CAD certificates.



Concerns and Suggestions

- Concerned about asking students to decide the career cluster so early in high school. But, it would allow you to get into very specific training courses.
- How do you fit exposure into career clusters in an already failing school system?
- Career ambassador program – on the website. Industry bios, pictures, faces. What they do, how they started out, etc. videos, pictures of career clusters. E-mail mentors.
- Career clusters provides a context for why they are learning. Kids need direction (Mark Feedback).
- A course on “Living on \$7 an hour.” Teach them what real-life is all about. (Dan Kees)
- Look for commonalities across clusters – not just pathways. So that a health person could go into manufacturing or construction. (Bruce Bird)
- Work-keys. ACT – assessment for math, reading. (Bruce Bird)
- Really want to see it to the students, parents, families.
- Look at other countries. What are they doing?

What advice would you give to a student considering a career in your industry?

- Come prepared to continually learn, because technology will always change and contribute so businesses can remain competitive. There are always opportunities to take a lead role in making the business more competitive and you’ll make yourself more valuable/marketable by being engaged in doing so.
- Never stop questioning. You never reach a point of “this is as good as it gets.” Average is unacceptable, good is just ok and you can always get better.

How can education and industry partner to better prepare Missouri students for this industry?

- Industry settings. Get some exposure into industries to help make choices.
- Johnson County Training Consortium – provides (limited) customized training funds in Warrensburg. Boost funding availability of customized training funds for employees that they already have to help them grown in to further positions and obtain the information they need to be successful.
- Schools in areas need to involve subject matter industry experts in classroom instruction. Get them out of the office for a day or a week and let them expose the students to real life situations. Have them work with their vendors to bring in equipment that can be left in the classroom and used for exposure. It’s an inexpensive industry for the vendor or the company because of the increase in the quality of the employment base that it’s going to make.
- If students want to go into these career industries, get them out in the plants for tours. If they want to know what goes on in these careers, these tours can let them discover “What does that mean to be in manufacturing or to be in marketing or do marketing for a manufacturer?”
- Getting them in the plants to let them realize that they must have a GED, that they must come to work everyday, etc.
- Partners in Education program in 1993 at 3M. They have developed a mentoring program, so that the employees actually go into the classroom to be with their protégés.
- Take your children to work day – make it take “a classroom” to work day. Getting the students to actually see it, because it develops a whole new perspective of what manufacturing can be. Allows them to see the glory that might be not printed.
- Allow some type of reward (credit hours) for training courses with working professionals in the same environment. Perhaps have professionals infused in the classroom / school so they are training there.
- Have a long-term view, not short term profit therefore more aid should be given to manufactures who expose this idea.
- Educators should be encouraged to spend sabbaticals in industry.
- Both educators and industry should work together to raise the social status of a career in industry.
- Educational institutions need to make sure they thoroughly understand the skills and methodology not just textbook version.
- Develop a promotion video exposing kids to the various opportunities in manufacturing. Pitch manufacturing as a desirable career path as opposed to a job of last resort.

Science, Technology, Engineering & Mathematics

In attendance were Ashok Agrawal, Emerson Center for Engineering & Manufacturing; David Disney, J.E. Dunn Construction; Karen Stelling, Burns & McDonnell; Mike Valentine, Thornton Tomasetti; and Nancy Alford and W. Doug Miller, DESE. All advisory participants are also on the Industry Council for Project Lead The Way.

Foundation Knowledge and Skills

- Only 1 of the 4 advisors had received and completed the survey
- Surprised that “ethical and legal” was only important and not very important
- “Database applications”— maybe thought office staff would be taking care of this, so it was not ranked as important? A software application question might be more appropriate.
- Summary—seems to validate importance of these statements
- “Identify patterns, relations, and functions of an organization”—felt it is more important than ranked. Could it have elicited a different response if phrased differently?
- Suggestion to send out Science and Math again to people that this group can identify. The group offered to suggest/contact participants. Doug suggested sending it to the participants of today’s meeting to send to their contacts.
- We need to pay more attention to those who are transitioning from work retirement to teaching for our teacher force.
- Pg 7 of 12, first 3 on page—commented that no opinion was due to not knowing what those standards are.
- Surprised that “manage, develop, and improve IT tools” was only slightly important, but again may be because they have others who do that
- Felt that “demonstrate and apply the design process” should also be more important.

What items are missing?

- Info on broad applications e.g. need to understand the broad fields of engineering such as mechanical, chemical . . .
- **Open-ended problem solving**
- Cross functionality of engineering
- Capstone course work—need a question if this is necessary or are you doing it?
- Model or demonstrating technique
- Sustainability, environmental concepts
- Could performance measures be added to these. If these were included, it would be easier to answer the questions.
- Suggest inclusion of integration/interdependence concept of academic areas to solve problems, such as math/science. Do they understand that engineering is cross-functional?

Additional thoughts:

- Group asked for handout information from Construction and Architecture cluster to be e-mailed to them.
- There needs to be a way to provide PLTW to adult students.

Are there grade levels at which these concepts need to be taught?

- Collaboration is important pre-graduation. Too often it is everyone for themselves in secondary. “Teaming” GAP
- We need extended days or school years.
- Experiential professional development is important.
- Definitely need open-ended problem solving to begin in elementary. (the open solution—no right or wrong answer) GAP
- We need to allow for exploration.—personal, local and global levels

Are there credentials for this cluster that we need to capture?

- Not at the high school level
- Many require engineering work experience
- There are many construction inspector certifications, but not for high school
- LEED could be learned and tested but would not be applied until later. LEED = Leadership in Energy and Environmental Design; e.g. includes “green” roofs
- ABET can have overarching concepts taught in school, but this is not an actual certification. Use the soft skills from the standards but not the ABET watermark.
- The Fundamentals of Engineering is too advanced.
- Certifications are too specialized for high school level.
- It would be unusual for a student to come from STEM and immediately go to work in the industry.

What advice would you give to a student considering this career cluster?

- Become aware of the possibilities in such a wide field, including specializations.
- Be aware that after working a few years that you may move into management. The industry is corporations.
- Realize the impact of engineering on all other fields. For example, the equipment in medical facilities. It touches every aspect of life.
- STEM is about improving the quality of life.
- There is a micro- and macro- aspect of engineering. You can design systems or small pieces.
- The ability to communicate an idea is number one. !!!
- The classic engineer is history because you have to communicate, manage, etc.
- Many aspects do not have failure as an option.
- It gives you the foundation to look at things differently. You ask yourself how you can make it better.
- Do you always want to know how things work, and how can you make it better?
- There are basics you have to take in high school if you don’t want to remediate at college. Take care of the 4 years of language, all the math and science you can take. Physics, chemistry, too. Per Ashok, this is true if you want to go into engineering right out of high school, but there are alternative routes.

What are your opinions of embedded credits?

- I wouldn’t equate one to one, but look more at the academy concept. Several courses could equal another course.
- Embedded credit might hurt the concepts of cross functionality, subjects crossing lines.

How can education and industry partner to better prepare Missouri students for this industry?

- I wouldn’t limit industry contacts to administrators and counselors, but include teachers.
- Involve industry in how curriculum is shifting, e.g., changes in science sequence
- Include information in education resources that include more listings of industry input.
- Develop advisory groups which include industry for districts, including Boards of Education, instead of at the program level. This ties in to serving all students instead of select groups. DISTRICT-WIDE INDUSTRY ADVISORY COUNCILS
- If you are developing all students for careers, you are enhancing the economy of the community. Impacts would address crime rates, poverty rates, substance abuse. . . . It goes to Maslow’s hierarchy of needs.



Transportation, Distribution and Logistics

In attendance were Don Bolin, McKay Buick of Jefferson City/Auffenberg Dealership of St. Louis; Rich Echols, Missouri Auto Dealers Association; Terry Imhoff, Missouri Department of Transportation; Gregg Sisk, Sure Seal, Inc.; Lee Swearingen, Missouri State Highway Patrol Mobile Equipment Specialist (retired); Paul McKay, Missouri Center for Career Education, University of Central Missouri; and Robert Hess, DESE.

Foundation Knowledge and Skills

What do we not need in Missouri?

- General comments given by survey respondents for this section the group felt that they were addressed in this skill section.

Which knowledge and skills are missing?

- A greater level of importance to developing tables, charts, and figures to support written and oral communications - the majority of the group felt that this was not a foundation skill.
- The soft skills and the knowledge of how to deal with issues, such as self confidence and problems, needs to be addressed or more effectively addressed. A separate course or topic. It needs to be an ongoing process not relegated to a grade level. This may present a problem with teachers who are overwhelmed with content to teach.
- Topics such as communication, conflict resolution, leadership skills etc. Should be listed under the section Employability and Career Development. Item # 2 in this section should be expanded to include a listing and it priority should be increased
- The need for compilation of data or a mathematics course in statistics

Which grade level should each be taught?

- Communications - Develop and delivering formal and informal presentations using appropriate media to engage and inform audiences. -Post-secondary Level.
- The committee agreed that the ones with the 2.0 and above are post-secondary appropriate.
- The committee agrees that the Technical skill foundations statements should all be taught at the Post-Secondary level.
- Under Systems, the Develop and manage plans and budgets to accomplish organizational goals and objectives should be taught at the post-secondary level, even though it is rated 1.82.
- Under Health and Environmental section the statement demonstrate personal commitment to safety, health, and environmental policies and procedures should be divided between secondary and post-secondary.
- Under the section Employability and Career Development items: Identify and explore career opportunities in one or more career pathways. And the statement Develop a personal career plan to meet career goals and objectives should be taught at the secondary level at an early grade level.
- Additionally the statement Identify and demonstrate positive work behaviors and personal qualities would also be appropriate for middle school.

Pathway Knowledge and Skills

Which do we not need in Missouri?

- None mentioned.

Which Knowledge and skills are missing?

- None mentioned

Which grade level should each be taught?

- One consideration the committee asked be made that awareness is a good thing.
- Under the section Transportation Operations, these skills should be taught at the post-secondary level.



- Under the section Logistics Planning and Management Services, these skills should be taught at the post-secondary level.
- Under the section Warehousing and Distribution Center Operations, these skills should be taught at the post-secondary level.
- Under the section Facility and Mobile Equipment Maintenance the first essential skill should be taught at the post-secondary level and the second skill at the secondary level.
- Under the section Transportation Systems/Infrastructure Planning, Management and Regulations, these skills should be taught at the post-secondary level. Take a look at the problem solving foundation skills at a secondary level.
- Under the section Health Safety and Environmental Management these skills should be taught at both levels.
- Under the section Sales and Service these skills should be taught at the secondary level.
- Under the Pathway Sections Comments the group urged more insight into the need for more information.

Credential/Certifications

What are the major certifications/credentials that we might work toward?

The committee reviewed the credential listed in the cluster book and agreed with those listed. The committee did not rank credentials probably because they could not provide this type of information.

The committee suggested these additional credentials as appropriate for the cluster:

- NATEF certification is missing.
- FCC license, may be appropriate to the Facility and mobile equipment repair
- NABER- check this name
- APCO- Association of Police Communications Officers
- Individual Manufacturer OEM certifications
- Mo state motor vehicle inspection certifications.

Consider how non-credentialed fields of study are credentialed in Missouri?

- Potential area for certification exists in the sales area.
- Concern of the acceptance of the credential nationwide.
- Needs to be a way of establishing a baseline for measuring competency.

What are the strengths of your industry?

- Provide jobs and tax revenue
- Higher paying jobs
- Promote safety throughout the state
- Provide continuous training for our employees
- Pay for performance
- Technology based industry

What are the challenges facing your industry?

- Incorporating new technology
- Workloads are heavier, a lot more is expected now than 20 years ago
- In some pockets of the state, service work is down
- Getting the industry to understand the need to be involved in the Ed system.
- The need to engage students at a younger age towards the industry.
- Input into the Ed system from a future employer. Implement a system of continuous learning.
- Students who are fully aware of the occupations available in this industry.

What trends are emerging in this industry?

- Change
- Movement towards high tech and customer convenience.
- The possibility of creating the maintenance free engine and system



Advice and insight to give to students

- Work on your soft skills.
- Take pride in your work.
- Character is important.

Suggestions for furthering the partnership between education and industry

- It is a difficult process.
- Try to get input from the people doing the work.
- A whole lot of issues that relate to making it better relations between the two. Teachers, (technical) need to seek out industry input.