

# STATEWIDE VALIDATION

of  
National Career Cluster Knowledge and Skills Statements  
with  
Suggestions to Better Prepare the Workforce of Tomorrow

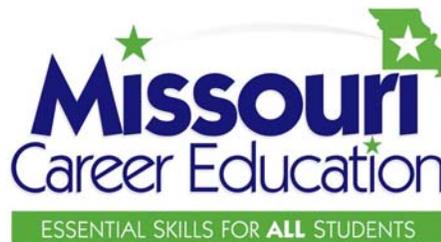
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*Responses Received from Online Survey of Missouri Business and Industry  
Conducted November 20, 2006 through January 8, 2007*

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## 16 Career Clusters

- *Agriculture, Food and Natural Resources*
- *Architecture and Construction*
- *Arts, Audio-Visual Technology, and Communication*
- *Business, Management and Administration*
- *Education and Training*
- *Finance*
- *Government and Public Administration*
- *Health*
- *Hospitality and Tourism*
- *Human Services*
- *Information Technology*
- *Law, Public Safety, Corrections and Security*
- *Manufacturing*
- *Marketing, Sales and Service*
- ***Science, Technology, Engineering and Mathematics***
- *Transportation, Distribution and Logistics*



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How essential are the following cluster foundation knowledge and skills to a career in STEM?

**COMMUNICATIONS:**

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Demonstrate effective oral, written, and visual communication.	<b>58% (14)</b>	42% (10)	0% (0)	0% (0)	0% (0)	<b>1.42</b>
<b>Total Respondents</b>						<b>24</b>

**ETHICAL AND LEGAL RESPONSIBILITIES:**

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Know current ethical and legal standards in the scientific and mathematics as well as the engineering and technology community.	46% (11)	<b>54% (13)</b>	0% (0)	0% (0)	0% (0)	<b>1.54</b>
<b>Total Respondents</b>						<b>24</b>

How essential are the following cluster knowledge and skills to a career in STEM? **INFORMATION TECHNOLOGY APPLICATIONS:**

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Use information technology to gather, store, apply and communicate data.	<b>54% (13)</b>	38% (9)	8% (2)	0% (0)	0% (0)	<b>1.54</b>
Evaluate the different technological tools used to manipulate and model data.	<b>38% (9)</b>	29% (7)	29% (7)	4% (1)	0% (0)	<b>2.00</b>
Use spreadsheet applications.	38% (9)	<b>50% (12)</b>	12% (3)	0% (0)	0% (0)	<b>1.75</b>
Use database applications.	17% (4)	33% (8)	<b>46% (11)</b>	4% (1)	0% (0)	<b>2.38</b>
Use collaborative/groupware applications.	8% (2)	<b>46% (11)</b>	33% (8)	4% (1)	8% (2)	<b>2.36</b>

Use computer operations applications.	21% (5)	<b>58% (14)</b>	12% (3)	8% (2)	0% (0)	<b>2.08</b>
Use computer-based equipment (containing embedded computers (or processors) used to control electromechanical devices).	25% (6)	<b>50% (12)</b>	8% (2)	4% (1)	12% (3)	<b>1.90</b>
<b>Total Respondents</b>						<b>24</b>

How essential are the following cluster knowledge and skills to a career in STEM? SAFETY, HEALTH AND ENVIRONMENTAL:

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Apply safety practices in your environment.	<b>58% (14)</b>	38% (9)	4% (1)	0% (0)	0% (0)	<b>1.46</b>
Develop a broad awareness of safety, health, and environmental hazards.	21% (5)	<b>54% (13)</b>	25% (6)	0% (0)	0% (0)	<b>2.04</b>
Engage in continuous improvement of environmental, health and safety practices.	25% (6)	<b>54% (13)</b>	17% (4)	4% (1)	0% (0)	<b>2.00</b>
<b>Total Respondents</b>						<b>24</b>

LEADERSHIP AND TEAMWORK:

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Participate effectively on a team.	<b>58% (14)</b>	42% (10)	0% (0)	0% (0)	0% (0)	<b>1.42</b>
Understand how and when to form teams	33% (8)	<b>50% (12)</b>	17% (4)	0% (0)	0% (0)	<b>1.83</b>
<b>Total Respondents</b>						<b>24</b>

How essential are the following cluster knowledge and skills to a career in STEM?

**EMPLOYABILITY AND CAREER DEVELOPMENT:**

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Identify patterns, relations, and functions of an organization or a workplace.	4% (1)	<b>48% (11)</b>	39% (9)	9% (2)	0% (0)	<b>2.52</b>
Exhibit continuous improvement for personal and professional growth.	35% (8)	<b>61% (14)</b>	4% (1)	0% (0)	0% (0)	<b>1.70</b>
Research career pathways in science, technology, engineering, and mathematics.	9% (2)	<b>48% (11)</b>	43% (10)	0% (0)	0% (0)	<b>2.35</b>
<b>Total Respondents</b>						<b>23</b>

What other skills and knowledge are essential as a foundation for success in an array of careers and educational pursuits in the Science, Technology, Engineering, and Mathematics career cluster?

<b>Total Respondents</b>	<b>6</b>
<i>(See Comments page)</i>	

Please select a career pathway:

		<b>Response Percent</b>	<b>Response Total</b>
Science and Mathematics		8.7%	2
<b>Engineering and Technology</b>		<b>91.3%</b>	<b>21</b>
<b>Total Respondents</b>			<b>23</b>

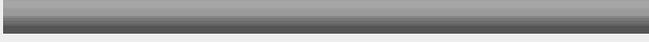
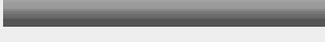
How essential are the following skills for the "Science and Mathematics" career pathway?

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Understand how science and mathematics function as an active component of the real world.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
Apply essential concepts and skills for proficiency in science and mathematics in real-world situations.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
Assess the impact that science and mathematics has on society.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
Use scientific and mathematical problem-solving skills to produce viable solutions to problems.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
Use critical thinking skills to translate, interpret, and summarize research and statistical data.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
Demonstrate knowledge and application of technical skills needed in a chosen scientific and mathematical field.	<b>100% (2)</b>	0% (0)	0% (0)	0% (0)	0% (0)	<b>1.00</b>
<b>Total Respondents</b>						<b>2</b>

What other skills and knowledge are essential for this career pathway?

<b>Total Respondents</b>						<b>1</b>
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How would you characterize your relationship to the workforce in the career pathway of Science and Mathematics? Answer as many as applicable.

		<b>Response Percent</b>	<b>Response Total</b>
<b>I make hiring decisions</b>		<b>100%</b>	<b>2</b>
<b>I supervise people who are in this career field</b>		<b>100%</b>	<b>2</b>
<b>I work in this career field</b>		<b>100%</b>	<b>2</b>
I have a friend or relative who works in this career field		50%	1
<b>I have an interest in improving the quality of the workforce in this area</b>		<b>100%</b>	<b>2</b>
<b>I have an interest in attracting more people to this career field</b>		<b>100%</b>	<b>2</b>
I have no professional connection with this career field		0%	0
Other (please specify)		0%	0
<b>Total Respondents</b>			<b>2</b>

Thank you for your responses. Please indicate what you would like to do next.

		<b>Response Percent</b>	<b>Response Total</b>
<b>Continue to the final wrap-up questions of this survey.</b>		<b>100%</b>	<b>1</b>
Return to the STEM list to select another career pathway.		0%	0
<b>Total Respondents</b>			<b>1</b>

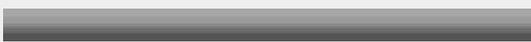
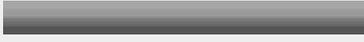
How essential are the following skills for the "Engineering and Technology" career pathway?

	<b>Very Important</b>	<b>Important</b>	<b>Slightly Important</b>	<b>Not Important</b>	<b>No opinion</b>	<b>Response Average</b>
Apply concepts and processes as defined by the National Council of Teachers of Mathematics in Principles and Standards for School Mathematics.	18% (4)	<b>36% (8)</b>	9% (2)	0% (0)	<b>36% (8)</b>	<b>1.86</b>
Apply concepts and processes as defined by the National Research Council in the National Science Education Standards, and by the American Association for the Advancement of Science in Benchmarks for Science Literacy.	14% (3)	36% (8)	5% (1)	0% (0)	<b>45% (10)</b>	<b>1.83</b>
Apply concepts and processes as defined in the Standards for Technological Literacy: Content for the Study of Technology.	14% (3)	27% (6)	9% (2)	0% (0)	<b>50% (11)</b>	<b>1.91</b>
Use information technology applications.	9% (2)	<b>82% (18)</b>	9% (2)	0% (0)	0% (0)	<b>2.00</b>
Manage, develop, and improve Information Technology (IT) tools.	5% (1)	29% (6)	<b>57% (12)</b>	5% (1)	5% (1)	<b>2.65</b>
Apply technological content concepts, and	32% (7)	<b>45% (10)</b>	18% (4)	0% (0)	5% (1)	<b>1.86</b>
Model technical competence.	18% (4)	<b>55% (12)</b>	14% (3)	5% (1)	9% (2)	<b>2.05</b>
Examine elements of the design process.	18% (4)	<b>64% (14)</b>	9% (2)	0% (0)	9% (2)	<b>1.90</b>
Demonstrate and apply the design process.	27% (6)	<b>59% (13)</b>	5% (1)	0% (0)	9% (2)	<b>1.75</b>
<b>Total Respondents</b>						<b>22</b>

What other skills and knowledge are essential for this career pathway?

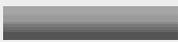
<b>Total Respondents</b>	<b>1</b>
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How would you characterize your relationship to the workforce in the career pathway of Engineering and Technology? Answer as many as applicable.

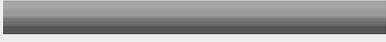
		<b>Response Percent</b>	<b>Response Total</b>
I make hiring decisions		87%	20
I supervise people who are in this career field		82.6%	19
<b>I work in this career field</b>		<b>91.3%</b>	<b>21</b>
I have a friend or relative who works in this career field		56.5%	13
I have an interest in improving the quality of the workforce in this area		73.9%	17
I have an interest in attracting more people to this career field		78.3%	18
I have no professional connection with this career field		0%	0
Other (please specify)		0%	0
<b>Total Respondents</b>			<b>23</b>

Thank you for your responses. Please indicate what you would like to do next.

		<b>Response Percent</b>	<b>Response Total</b>
<b>Continue to the final wrap-up questions of this survey.</b>		<b>95.5%</b>	<b>21</b>
Return to the STEM career cluster list to select another pathway.		4.5%	1
<b>Total Respondents</b>			<b>22</b>

In which state do you live?			
		Response Percent	Response Total
Missouri		72.7%	16
Other (please specify)		27.3%	6
<b>Total Respondents</b>			<b>22</b>

Please indicate the professional area in which you work:			
		Response Percent	Response Total
Business/Industry		90.9%	20
State Agency		0%	0
Federal Agency		0%	0
Association/Chamber		4.5%	1
Secondary Education		0%	0
Postsecondary Education		0%	0
Other (please specify)		4.5%	1
<b>Total Respondents</b>			<b>22</b>

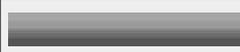
Years of work experience:			
		Response Percent	Response Total
Student		0%	0
0-1		0%	0
2-5		4.5%	1
6-10		0%	0
11-20		9.1%	2
<b>21-30</b>		<b>59.1%</b>	<b>13</b>
31+		27.3%	6

<b>Total Respondents</b>	<b>22</b>

What other comments would you like to add related to career education in Missouri?

<b>Total Respondents</b>	<b>0</b>

Would you be willing to participate in future surveys like this related to Missouri Career Education and workforce development?

		<b>Response Percent</b>	<b>Response Total</b>
<b>Yes</b>		<b>36.4%</b>	<b>8</b>
<b>Maybe</b>		<b>36.4%</b>	<b>8</b>
<b>No</b>		<b>27.3%</b>	<b>6</b>
<b>Total Respondents</b>			<b>22</b>

Would you be willing to serve on a local or state advisory council for the betterment of career education and workforce preparation in Missouri?

		<b>Response Percent</b>	<b>Response Total</b>
<b>Yes</b>		<b>13.6%</b>	<b>3</b>
<b>Maybe</b>		<b>18.2%</b>	<b>4</b>
<b>No</b>		<b>68.2%</b>	<b>15</b>
<b>Total Respondents</b>			<b>22</b>

If you indicated "yes" or "maybe" to either of the two questions above, please provide DESE your contact information (include name, company, address, telephone number, and e-mail address). This information will be used solely for the purposes described.

<b>Total Respondents</b>	<b>9</b>

## Through which channel did you receive this survey?

		<b>Response Percent</b>	<b>Response Total</b>
<b>Trade association or professional society</b>		<b>77.3%</b>	<b>17</b>
Chamber of Commerce or industry group		0%	0
Business colleague		4.5%	1
e-mail from Department of Elementary and Secondary Education		13.6%	3
Educator		4.5%	1
Website link		0%	0
Word-of-mouth		0%	0
Other (please specify)		0%	0
<b>Total Respondents</b>			<b>22</b>

## 25. Was this survey easy to use?

		<b>Response Percent</b>	<b>Response Total</b>
<b>Yes</b>		<b>81.8%</b>	<b>18</b>
No		0%	0
Somewhat		9.1%	2
Comments		9.1%	2
<b>Total Respondents</b>			<b>22</b>

## COMMENTS FOR SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS:

### FOUNDATION Knowledge and Skills:

What other skills and knowledge are essential as a foundation for success in an array of careers and educational pursuits in the Science, Technology, Engineering, and Mathematics career cluster?

1. Problem solving techniques.
2. Technical skills are a base requirement, but communication skills are very important too.
3. The 3 "R's"...plus good speaking, good vocabulary, good social skills, and good manners
4. Oral and written communication skills are ESSENTIAL
5. Mathematics is the language of science, it has been said. A second language is becoming more and more important. Knowledge of history, geography and such are important. The broader the exposure in the formative ages, the better equipped they are for more directed learning in future studies.
6. Thorough understanding of mathematics. Ability to be accurate, precise and thorough in their work.

### PATHWAY Knowledge and Skills:

#### PATHWAY – SCIENCE AND MATHEMATICS

What other skills and knowledge are essential for this career pathway?

1. Communications and knowledge of the non-technical world about you.

#### PATHWAY – ENGINEERING AND TECHNOLOGY

What other skills and knowledge are essential for this career pathway?

1. In all disciplines, written and spoken communications are of primary importance. Knowledge of the world around you and in which you must function is very important.

### OTHER COMMENTS:

None.