California
Innovation
Corridor

WIRED 1.2 QUALITATIVE REPORT

RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY

INTRODUCTION

This report examines the current and future workforce needs of high technology industry employers in Riverside County. For this study, the high technology industry was defined as firms categorized into one of the four general industry classifications that included the following NAICS classifications:

- 3254 - Pharmaceutical and Medicine Manufacturing

- 3344 - Semiconductor and Other Electronic Component Manufacturing

- 3345 - Navigational, Measuring, Electromedical, and Control Instruments Manufacturing

- 5417 - Scientific Research and Development Services.

Under most industry definitions, this includes employers in the bio-technology, advanced manufacturing, and facets of the computer industry.

The primary research in this report is based on 18 qualitative survey discussions with high technology employers. These qualitative survey discussions allowed us to gather information in an open-ended format regarding the current and future workforce needs of regional high technology employers. It should be noted that two follow-up surveys from contacts made by the California Economic Development Department's Labor Market Information Division yielded incomplete results and are not included in this report.

I. FUTURE OF THE INDUSTRY

1. WHERE IS THE INDUSTRY GOING AND HOW WILL CHANGES IN THE INDUSTRY SHAPE THE WORKFORCE?

The first section of the report focuses on the future of the industry, where it may be going, and how changes are anticipated to shape the workforce.

- *What are the issues/ideas driving your industry? What do you see as the next frontier? The next great breakthrough?*

ISSUES AND IDEAS DRIVING YOUR INDUSTRY

When asked to reflect on the issues and ideas driving their industry, responses among high technology employers in Riverside were varied. Themes cited by at least two respondents included: environmental issues, innovation, health care costs and insurance, finding talent and population growth.

Environmental Issues Five of the respondents indicated that environmental issues were driving their industry, including how to meet Air Quality Management District

regulations. One specifically mentioned that "water conservation has been a big driving force and will be for a long time as our resources deplete" and another mentioned human encroachment on wildlife and "how to replace wildlife habitats with vegetation."

Innovation Four respondents revealed that innovation, and the need for more innovation, was driving their industry. One respondent remarked that it is important to have "alternative plans from what we're used to" and another noted that there is "a lack of ability on (the part of) a lot of people in the area to look ahead five years or less. They don't seem to be grasping what may be going on five years down the line." Another respondent commented that innovation can be increased through collaboration with universities.

Health Care Costs and Managed Care Two respondents mentioned that health care costs as well as managed care (e.g., HMOs) were driving their industry.

Finding Talent Two respondents felt that finding talent was driving their industry. One indicated that "there are a few smart people who are discovering things, but when they want to develop those ideas, they can't find enough skilled technicians to work on them - the reason being is that the entrepreneurial investments won't pay the key technicians a salary that is competitive with the non-scientific industries."

Population Growth Two respondents said that population migration into Riverside County drives their industry.

NEXT GREAT BREAKTHROUGH

Respondents were next asked to think about the next great breakthrough or frontier for their industry. Responses generally centered on two themes: technological advances and scientific advances.

Technological Advances and Development of New Equipment Six of the respondents in Riverside County felt that the next great breakthrough would center on technological advances and the development of new equipment. Responses were varied, reflecting respondents' niche or area of focus. Examples include non-invasive diagnostic tools, increased automation for production, and advancements in computers. One respondent commented on the need for the cost of technology to come down so that scientists have more access to it so that they can strengthen their findings and increase their knowledge base through the use of the equipment.

Scientific Advances The next most frequently cited response involved scientific advances in the industry, such as "finding new biologics -like a protein in DNA- that can be used to make new drugs with a higher safety profile," "miniaturization of basic scientific bench work," and "curing cancer." One respondent also commented on the continued "integration of different research disciplines -for example, physics and biology are now biophysics."

How do you think the future of the industry will impact the skills needed in the workforce?

When asked how the future of the industry will impact the skills needed in the workforce, responses generally fell into one of three categories:

1. Improved skills and education,

2. Customer service, work ethic, and communication skills, and

3. Understanding new technologies, equipment, and automated machinery.

Improved Skills and Education – More Math, Science, Engineering, and Computer Skills Seven of the respondents mentioned that the future workforce is going to need improved skills and education, especially in math, science, engineering, and computers.

Customer Service, Work Ethic, and Communication Skills Six respondents indicated that customer service, a strong work ethic, and communication skills will be important for the future workforce. Specifics included strong written communication, media and communication skills, good manners when dealing with customers, maturity, and a strong work ethic.

Understanding New Technologies, Equipment, and Automated Machinery Four respondents noted that there will be a need for increased understanding of new technologies, equipment, and automated machinery among the future workforce.

II. IDEAL SKILLS, EDUCATION AND EXPERIENCE NEEDED TO EFFECTIVELY STAFF UP BOTH NOW AND IN 10 YEARS

The next section of the report focuses on the skills, education, and experience needed by Riverside County organizations to effectively staff up both now and 10 years from now.

2. WHAT COMBINATION OF EDUCATION, SKILLS, AND EXPERIENCE WILL BE THE MOST VALUABLE IN THIS INDUSTRY AT EACH LEVEL? WHERE WOULD YOU RANK THE NEED FOR MANAGEMENT EXPERTISE, SCIENCE EXPERTISE, INTERDISCIPLINARY EXPERTISE, ETC.?

- *Managerial Level*

Combination of Education and Experience Two-thirds of Riverside County respondents indicated that a combination of education and experience was most valuable in their industry at the managerial level. Most respondents mentioned the need for a Bachelor's or Master's degree and five years' experience. Some also noted that a lower degree would be acceptable if the person had eight to 10 years of experience.

Education Four respondents remarked that education was most valuable for success at the managerial level. Most of these respondents mentioned a Bachelor's degree or higher in the sciences (biological sciences, chemistry, geology) or engineering. One respondent also commented on the need for certification from the American Institute of Certified Planners (AICP) and another emphasized the importance of English writing skills in addition to four-year degrees.

- *Professional Level*

Similar to the managerial level, respondents felt that education and a combination of education and experience were most valuable at the professional level.

Education Whereas education was the second most popular response at the managerial level, education ranked first for success at the professional level and was cited by half of Riverside County respondents. Five of these respondents specifically mentioned a Bachelor's or Master's degree in the sciences or engineering as well as certificates and "field school" beyond the four-year degree. The remaining respondents mentioned "some college," "training in the biological sciences," or certification as a Certified Engineering Geologist (CEG).

Combination of Education and Experience Six of the respondents indicated that a combination of education and experience was the most important for success at the professional level. Many mentioned a preference for at least a high school diploma, some college, or vocational training and approximately three years of experience.

- *Technician Level*

Education Like the responses at the professional level, half of the respondents remarked that education was the most valuable at the technician level. Five of the seven indicated that a Bachelor's degree in the sciences was preferred and two noted the importance of knowledge of laboratory techniques along with the degree. One respondent also noted that although a Bachelor's degree was preferred, someone with a high school or Associate's degree could be successful as long as they had two or three years of work experience. Another respondent said that candidates with computer skills and at least an Associate's degree were preferred at the technician level.

Combination of Education and Experience Five respondents felt that a combination of education and experience was most valuable at the technician level. These respondents generally noted the need for a high school degree or vocational education as well as two years or more experience.

GREATEST NEED

When asked where they saw the greatest need, 80 percent of respondents who answered the question felt that there was the greatest need for interdisciplinary expertise, 67 percent noted science expertise, and only 47 percent indicated management expertise (multiple responses permitted for this question).

Figure 1 Overall Greatest Need
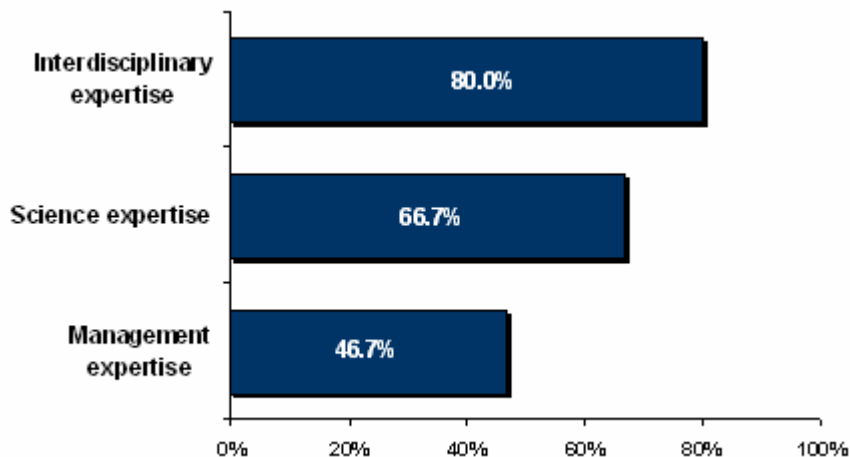
3. IS THERE A CRITICAL SKILLS SHORTAGE IN THE TYPE OF SKILLS NEEDED FOR 21ST CENTURY INNOVATIVE BUSINESSES – AND IF SO, WHAT SKILLS ARE MISSING AT EACH LEVEL? AT WHICH LEVEL IS ANY GAP MOST CRITICAL?

Overall, 78 percent of respondents indicated that there was a critical skills shortage in the type of skills needed for 21st Century innovative businesses.

Figure 2 Critical Skills Shortage
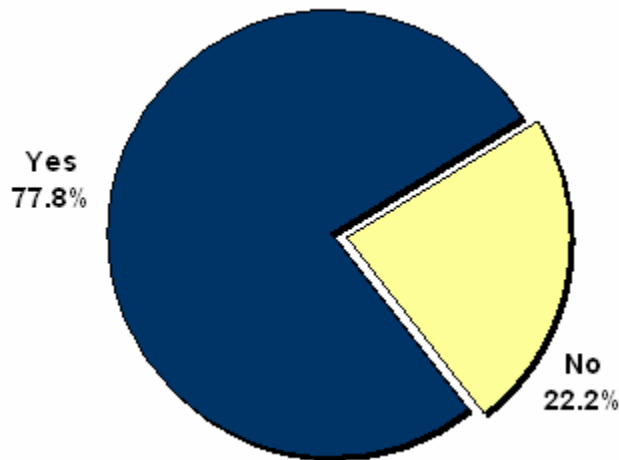
The responses to follow for each level are among the 78 percent of respondents that indicated that there was a critical skills shortage.

- *Managerial Level*

Respondents felt that communication skills (written and verbal), people skills, leadership skills, analytical skills, human resources knowledge (duties and laws), and previous managerial experience were the skills missing at the managerial level.

- *Professional Level*

At the professional level, respondents stressed the importance of technical skills (electronics, computer software and applications, equipment), writing skills, and extensive scientific training and knowledge.
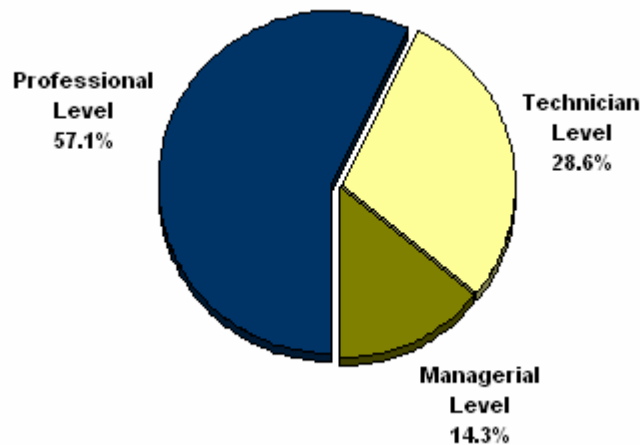
- *Technician Level*

At the technical level, respondents remarked that individuals need more laboratory skills and experience, communication and writing skills (emphasis on English), math and science skills, technical skills (computers and electronics), and a stronger work ethic and better attitude.

AT WHICH LEVEL IS THE GAP MOST CRITICAL?

Fifty-seven percent of respondents in Riverside County felt that the gap was most critical at the professional level, 29 percent felt it was most critical at the technician level, and 14 percent indicated the managerial level.

Figure 3 Level at Which Gap is Most Critical

4. WE WOULD BE INTERESTED IN HEARING

The next series of questions asked respondents to profile effective employees at the manager, professional, and technician levels both today and 10 years from now.

• *How would you profile today's effective manager?*

The most frequently cited responses to this question for managers centered on three themes:

1. Managers being good communicators and having strong people skills,

2. Having experience and knowledge in the industry, and

3. Having accounting and human resources knowledge.

It should be noted that many respondents mentioned responses that were classified into more than one category.

Good Communicator/ Strong People Skills Fourteen of the Riverside County respondents felt that today's effective manager is a good communicator and has strong people skills. Specifics included strong interpersonal skills, communication skills (written and verbal), being able to speak Spanish, organizational skills, being a "people person," the ability to enhance their employees' abilities, knowing how to handle different personalities, and being a strong leader and motivational.

Experience and Knowledge of the Industry Seven respondents noted that experience in the industry and knowledge of the industry most defined today's effective manager.

Accounting and Human Resources Knowledge Five respondents indicated that today's effective manager has strong accounting and human resources knowledge. Accounting knowledge included following business performance and profitability, staying on top of budgets, billing knowledge, contracting experience, and someone who can

obtain funding for the company. Human resources knowledge included responses such as knowledge of human resources laws (new and existing), human resources skills, and employee retention.

- ### *How would you profile an effective manager in 2018?*

Continue to Grow/ Advance with Technology The majority of respondents indicated that effective managers in 2018 will need to continue to grow and advance with technology. Specifics included communications technologies, computer knowledge and skills (including the internet), and continuing to further their education to stay up-to-date.

Effective with Resources Four respondents felt that effective managers in 2018 will need to be effective with resources, such as staying on budget, being mindful of performance and profit, being more involved with financial, production and marketing activities, and "using minimal resources to achieve the greatest output."

Same Qualities as Now Three of the 18 respondents indicated that an effective manager in 2018 will have the same qualities as today's effective manager.

- ### *How would you profile today's effective professional?*

Educated and Experienced Close to a majority of respondents mentioned that today's effective professionals are educated and/ or experienced. Although most responses were general, some of the specifics cited included: two to five years of experience, strong science knowledge, experience and research in drug discovery, and "the newer the education, the better" since the information taught in schools has changed over the years.

Dedicated and Willing to Learn Three respondents commented that today's effective professionals are dedicated, responsible, have strong work ethics, and a willingness to learn.

Strong Communication Skills Three respondents mentioned the importance of strong communication skills and being able to interact with both management and employees as well as work collaboratively with other leaders.

Computer Literate Three respondents noted that computer literacy is a key component of being an effective professional.

Resourceful and Forward Thinking Two respondents indicated that effective professionals are resourceful and forward thinking.

How would you profile an effective professional in 2018?

Same Qualities as Now Seven of the respondents indicated that an effective professional in 2018 will have the same qualities as today's effective professional.

Knowledge and Expanding Skills Sets with Technology – Staying Up-to-Date The majority of respondents remarked that to be effective in 2018, professionals will need to stay up-to-date with changing technologies and education, such as advances in environmental and biomedical engineering. Many respondents specifically mentioned the importance of keeping up with computer and communications technology.

- *How would you profile today's effective technician?*

Strong Work Ethic Six respondents felt that today's effective technician was most defined by their strong work ethic, "somebody who wants to work hard and someone who's willing to be dedicated."

Desire to Expand their Knowledge Three respondents indicated that today's effective technicians have a strong desire to expand their knowledge base and education and are willing to learn new things.

Communication/People Skills Two respondents said that in addition to having sound skill sets, effective technicians need good interpersonal and communication skills.

Efficient Two respondents remarked that today's effective technicians are efficient and consistently perform their tasks well. One respondent noted that effective technicians are successful in "making good use of their time and succeeding in getting the jobs done on time and cutting the costs and getting it done for under cost."

Educated and Experienced Two respondents defined today's effective technicians as being educated (vocational school or four-year degree) and also having some field experience (one noted that two to five years experience is preferred).

- *An effective technician in 2018?*

Same Qualities as Now Six respondents indicated that an effective technician in 2018 will have the same qualities as today's effective technician.

Keep up with Technology and Stay Current with Education Five respondents felt that effective technicians in 2018 will need to stay current with education and keep up with technology so they can "be on the cutting edge."

Increased Knowledge Base Related to the previous category, two respondents remarked that effective technicians in 2018 will need to have an increased knowledge base and the ability to improve on standard procedures and "contribute more scientific knowledge to the team."

Five of the respondents did not provide a comment on what would define today's effective technician or an effective technician in 2018.

III. LEADERSHIP AND SKILLS GAP ANALYSIS

The next section of the report focuses on leadership and the ability to find qualified workers.

5. DO THE CURRENT LEADERS IN YOUR COMPANY HAVE A BROAD SPAN OF KNOWLEDGE THAT CROSSES BEYOND THE SCIENTIFIC FOCUS?
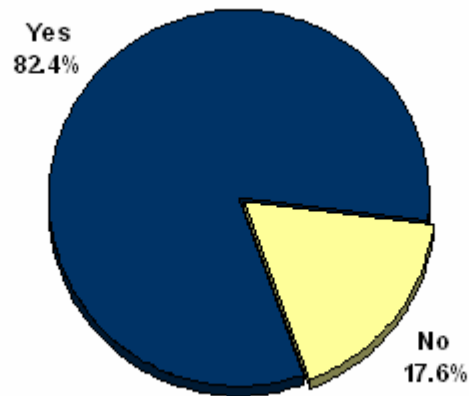
Eighty-two percent of respondents felt that current leaders in their organization have a broad span of knowledge that crosses beyond the scientific focus.

Figure 4 Current Leaders Have Broad Span of Knowledge

- *What skills will future leaders need to have?*

When asked what skills future leaders will need, responses generally fell into one of four categories:

1. Keep up with technology and stay on the cutting edge,

2. Strong business principles, skills, and knowledge,

3. More education and scientific background, and

4. Strong communication skills, people skills, and leadership.

It should be noted that a few responses included detail that fell into more than one category.

Keep up with Technology and Stay on the Cutting Edge Eight respondents indicated that future leaders will need to keep up with technology and be on the cutting edge, including being able to keep an open-mind and "think outside the box." One respondent mentioned the importance of interdisciplinary knowledge with the ability to "extract meaningful conclusions from a wealth of data."

Strong Business Principles, Skills, and Knowledge Six respondents felt that strong business principles, skills, and knowledge would be very important for future leaders. Specifics included: business administration skills, human resources skills, sales skills, and knowledge of State and Federal environmental law, contract law, and business law. One respondent also commented on the need for future leaders to be able to "develop new opportunities to get good people and reduce costs of business."

Strong Communication Skills, People Skills, and Leadership Six respondents felt that strong communication skills, people skills, and leadership would be very important for future leaders. This included motivating staff, the ability to lead by example, "attracting the best and brightest," and strong communication skills.

More Education and Scientific Background Four respondents emphasized that future leaders will need to have more education and a stronger scientific background for success.

- *Where will you be looking for the future leaders?*

Six respondents indicated that they will look for future leaders directly from **universities**, with many focusing on recent college graduates.

Following universities, the next most popular responses were looking **internationally**, looking at **current employees within the industry**, looking **in-house**, in **the military**, and through advertising on the **internet**, **newspapers**, and by using **recruiting agencies**.

IV. EDUCATION REPORT CARD

The next section of the report focuses on educational institutions that have been serving the industry, those that are anticipated to successfully serve the industry, and what educational institutions may need to do to ensure they can meet future industry demands and prepare skilled workers.

6. ARE THERE SPECIFIC EDUCATIONAL INSTITUTIONS OR TYPES OF INSTITUTIONS (E.G. COMMUNITY COLLEGES, FOUR-YEAR UNIVERSITIES, MANUFACTURING TECHNOLOGY CENTERS) THAT HAVE BEEN PARTICULARLY GOOD IN MEETING YOUR SKILL NEEDS? ARE THERE ONES THAT HAVE BEEN BAD?

The first question in this section asked respondents whether there have been any specific educational institutions that have been particularly good, or particularly bad, in meeting their skill needs.

INSTITUTIONS THAT HAVE BEEN PARTICULARLY GOOD

Universities Eleven of the respondents indicated that four-year universities have been successful in meeting their skill needs. The following were specifically named: University of California, Berkeley, University of California, Davis, University of California, Irvine, University of California, Los Angeles, University of California, Riverside, University of California at San Diego, Cal Poly San Luis Obispo, Cal Poly Pomona, California State University Fullerton, San Diego State University, Stanford University, Cornell University, Arizona State University, Indiana –Earlham, ivy league schools, and "any of the University of California institutions."

Community Colleges Three respondents indicated that community colleges have been good at meeting their needs. Riverside Community College, Copper Mountain Community College and College of the Desert were specifically mentioned.

Two respondents remarked that no schools have been particularly good at meeting their skill needs and one respondent said that they did not know.

Institutions that Have Been Particularly Bad

When asked if any institutions have been particularly bad in meeting their skill needs, 61 percent responded "No." Among the five respondents that indicated "Yes," four specifically mentioned a four-year university. One respondent also said that community colleges and technical schools do not meet their skill needs. A few noted that it was the individual and their work ethic that dictated success, not necessarily the educational institution. Two respondents said that they did not know.

The following were the universities specifically named: University of Colorado, Purdue University, and University of California, Riverside. One respondent commented that "The burden is on the 4 year colleges, and they're not meeting it."

7. ARE THERE EDUCATIONAL INSTITUTIONS YOU THINK WOULD BE GOOD AT MEETING THE NEW SKILL REQUIREMENTS THAT YOU FORESEE?

Fifty-nine percent of respondents indicated that there were educational institutions that would be good at meeting the new skills requirements that they foresee.

Figure 5 Educational Institutions to Meet the New Skill Requirements
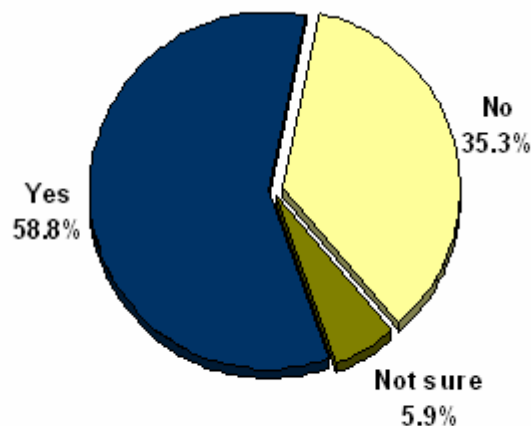
Among those who said "Yes", nine respondents mentioned either a four-year university or a community college.

Four-year Universities Among the seven respondents who mentioned a four-year university, the following universities were specifically mentioned: Stanford University, University of California, Berkeley, San Jose State University, Cal Poly Pomona, University of California, Riverside, "the Jesuit University in the South Bay" (respondent could not recall the name), the University of California system, and the California State University system.

Many respondents also noted that improvements to curriculum will be needed among these universities to meet the new skill requirements.

Community Colleges Two respondents indicated that community colleges could meet the new skill requirements. One respondent generally mentioned community colleges and the other indicated community colleges that "focus on technology skills."

8. WHAT DO YOU THINK NEEDS TO BE DONE TO ENSURE THAT OUR EDUCATIONAL INSTITUTIONS PREPARE INDIVIDUALS FOR THE SKILLED JOBS YOU SEE IN THE FUTURE?

Respondents were next asked to weigh in on what educational institutions need to do to prepare individuals for the skilled jobs of the future. Responses generally centered on two themes:

1. More hands-on training and internships, and

2. More funding for education and more challenging curriculum.

More Hands-On Training and Internships Six respondents felt that it was important for educational institutions to provide more hands-on training and internship programs to students. A couple of respondents specifically mentioned that most schools are too focused on theory and do not offer enough hands-on application of what students are learning. A few also commented that hands-on training and internships would allow students to test out what they are learning to see if they like it and see what opportunities will be available to them after school.

More Funding for Education/ Challenging Curriculum Six respondents mentioned that educational institutions will need more funding and a more challenging, diversified curriculum in order to prepare individuals for future skilled jobs. A couple of respondents emphasized the importance of revising curriculum to keep up with new technology and processes. One respondent commented that schools will need a "broad scope to their education - with a strong focus on the scientific, but making sure that business skills and people skills are (also included) in their education."

V. PRIMARY CONCERNS & KEY MESSAGE FROM INDUSTRY

The last section of the discussion focused on respondents' key concerns for ensuring a skilled workforce as well as the key message they would like to deliver to California leadership at both the state and local levels.

9. WHAT ARE SOME OF YOUR KEY CONCERNS ABOUT ENSURING A SKILLED WORKFORCE IN THE FUTURE?

Sixty-one percent of respondents in Riverside County felt that the lack of basic math and science skills was the top concern about ensuring a skilled workforce in the future. This was followed by concerns over the lack of a system to quickly incorporate needed changes into the education system and the lack of easily accessible training for professionals and management to gain added knowledge necessary to move into different areas (both at 56%). Half of respondents felt that educators' lack of a broad understanding of key elements driving industry was important to the workforce of the future. Only one-third noted that the lack of interest in becoming a bench scientist was a concern for ensuring a skilled workforce in the future.

Figure 6 Key Concerns about Ensuring a Future Skilled Workforce
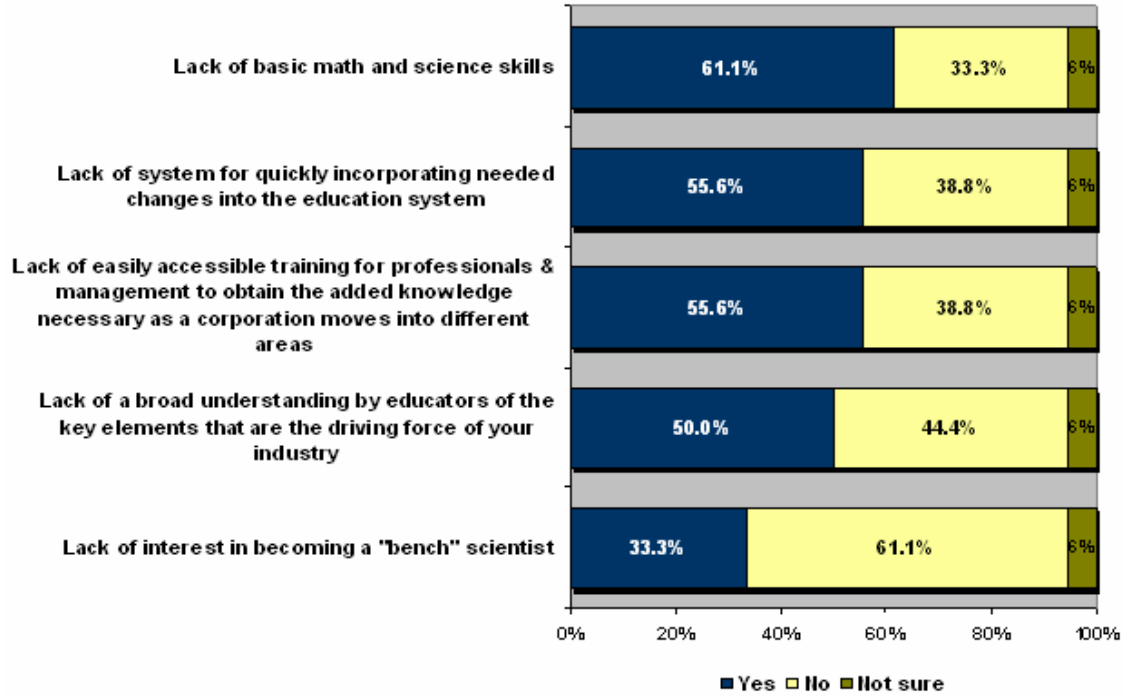
10. WHAT IS THE KEY MESSAGE CONCERNING WORKFORCE DEVELOPMENT THAT YOU, AS AN EXECUTIVE, WOULD LIKE TO GIVE TO CALIFORNIA LEADERSHIP AT THE STATE AND LOCAL LEVELS?

At the end of the discussion, respondents were asked to reveal the key workforce development message that they would like to give to California leadership.

Nearly all of the respondents wanted to deliver a message related to the **education system**. Their messages focused on three themes:

More/ Better Science Education Six respondents wanted to pass on the importance of providing students with a solid foundation of scientific principles and a strong science education. Two of these respondents specifically noted the need to improve access and the quality of science education at the high school level. As one respondent noted, "every graduate of secondary education in the state of California should be able to communicate basic scientific principles."

Improve the Educational System Five respondents indicated that they want to pass on the importance of improving the educational system. Examples included the need to stop wasting money by paying too much money to administrative staff, "commit to educate and believe in our workforce," the need to "give as much knowledge to the children in school as you can, and let them know how difficult it is out there." One respondent noted that "we need to rebuild the education system, but it's going to be difficult because once you lower the bar, it's hard to raise it."

Develop More Skilled Workers Four respondents noted the importance of developing more skilled workers by "integrating theories with a practical skill set" and encouraging "the educational institutions to take a closer look at what business really needs."

VI. METHODOLOGY

This project was comprised of 18* qualitative survey discussions with high technology employers in Riverside County. While qualitative survey discussions are an excellent tool for exploring topics and gathering extensive, in-depth responses, the small sample size and the nature of qualitative research techniques are not meant to result in statistically representative data. Interpretation of qualitative research responses can also be subjective. Prior to writing the report, responses were transcribed and reviewed in their entirety. Responses for each question were then grouped into categories based on their similarities and the themes that emerged.

* Two follow-up surveys from contacts made by the California Economic Development Department's Labor Market Information Division yielded incomplete results and are not included in this report.

The table below provides an overview of the methodology utilized for the project.

Table 1 Overview of Project Methodology

Method	Qualitative Survey Discussions (Telephone and In-Person)
Universe	High Technology Employers in Riverside County
Number of Respondents	18 High Technology Employers Participated
Average Length	40 minutes
Field Dates	March 18 – June 20, 2008