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Report on the San Diego Qualitative Survey WIRED 1.2 – 21st Century Jobs

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Introduction

The biotech sector of the economy in San Diego County provides many jobs throughout the region, and has developed into one of the world's most prominent areas for pharmaceutical research. The WIRED program, (Workforce Innovation in Regional Economic Development), seeks to learn what local life sciences companies want in current and future employees and accordingly teach those skills to prospective workers. Within the scope of innovation between business and education, it is the goal of the WIRED program to merge these two seemingly disparate enterprises together to enable education to become more efficacious for the needs of business now and in the future.

The goals of the research conducted at the San Diego Workforce Partnership were to discover what skills were lacking among workers in these biotech sector businesses and to assess how these shortages could be rectified. More specifically, the Workforce Partnership sought to expand its knowledge of five issues: discovering the future of the industry; finding what the ideal skills of workers are now and what they would be in the future; assessing leadership qualities and gaps that may exist within the companies surveyed; determining what role education has in providing adequately prepared workers; and elucidating the primary concerns that companies have about ensuring a skilled workforce in the future. Clarifying these characteristics will assist in the future planning of stronger links between education and industry helping to determine which skills are necessary or lacking in current workers, and what the future holds for the biotech industry.

Methodology

The survey focused on interviewing mostly hiring managers and human resources professionals at biotech companies to find out the qualities they look for in workers and future employees. The State of California Employment Development Department provided the list of target firms. Workforce Partnership staff interviewed twenty professionals at local companies throughout the San Diego region focused on research and development, environmental and ecological services, pharmaceutical research, and drug production. Some of these companies answered the survey by phone and others e-mailed their answers on a provided Microsoft Excel template. Specifically, staff completed fifteen phone interviews and five e-mailed responses. Staff asked a series of eleven questions focusing on the qualities of workers and the industry. A copy of the questionnaire used is included at the end of this report.

Findings

Because this study was limited in scope, and not statistically relevant, the results discussed here are directional in nature. In describing the future of the biotech industry in San Diego, a few themes emerged that point to what the specific problems are within San Diego and even on a more global level. Generally, most respondents predicted future growth in the industry, describing future technological developments that would be taking place. However, there were concerns about several issues that became clear.

Future of the Bio Tech Sector

First, six companies described fears pertaining to a shortage of trained scientists in the San Diego area; this encompassed more competition among companies to hire

quality employees, who are becoming more scarce. As one human resources executive at a local biotech company described:

I think San Diego has a terrible shortage of trained scientists, and because of the cost to import people to San Diego, it is virtually impossible, even with housing prices being down 20%, it's still twice as expensive as many other areas of the country. So the problem that we have is the problem that all other biotechs have, there's a very limited trained labor supply and we all end up stealing from one another to get the talent that we need or paying a fortune to import it. So on a very macro-level, that's where I see a concern with the workforce in San Diego.

Part of the problem in finding quality employees stemmed from the larger dilemma of retiring Baby-Boomers. Although the retirement of this core population poses the possibility of more jobs becoming available, the problem lies in finding prepared candidates to fill those positions. Several respondents specified concerns that new workers would not be prepared to take over the jobs of retiring employees with many years of experience and an especially strong work ethic. Three companies expressed explicit concern about this issue.

Another concern of five of the companies was the pressure to curb costs; one cut that may be made is the reduction of funds set for research. This action would leave research responsibilities to smaller biotech companies at the local level rather than by large conglomerates, as mentioned by another biotech professional. However, the reduction of costs would also be pursued through establishing research and manufacturing locations outside of the United States, especially in countries like China

and India. Four companies expressed concern about this consequence of tightening funds and outsourcing jobs overseas. This would especially be likely in the areas of manufacturing, clinical development, and data management according to a vice president of human resources at a specialty pharmaceuticals company. This problem partially stems from the lack of qualified scientists here in the United States, which came up during the six interviews that were mentioned earlier.

Along with outsourcing jobs to foreign countries, companies are also seeking to hire foreign workers here in the United States, according to the president of a local biosciences company. This same president identified a separate set of problems that comes from this strategy: **language problems**. Communication problems have often gotten in the way of some workers from overseas fulfilling all the requirements of their jobs. **Lure of higher education**. Although many foreign workers have proven that they are hard-working, they often leave their positions at these companies to pursue higher education once they are here in the United States. **Legal expenses**. While they are at their jobs, legal expenses involving their visas often cost companies even more.

The next frontier or breakthrough in the industry generally lies in the pursuit of new technology and new treatments with a focus instead on prevention, according to five companies. However, another problem became apparent with the pursuit of this groundbreaking work: the ability to find workers who were experienced in that particular field. By the very definition of groundbreaking, experience in any innovative field would be difficult to find. A human resources professional at a biotech company specifically highlighted this problem. This is one particular challenge that might be helped by a more direct line of communication between the biotech industry and educational facilities,

especially universities that would be more likely to get grants to pursue new technologies and treatments.

Eight companies emphasized the fact that the skills in the future workforce would remain the same, such as hard work, knowledge of the basic sciences, problem-solving ability and a strong educational background. However, according to seven companies, the skills needed in the in the future should lie in the ability to keep up with technological innovations and knowledge that develops. Some corresponding skills stressed by a pharmaceutical company, an environmental services company, and a drug milling company will be the ability to work remotely as the workforce landscape changes, general problem-solving ability, and the ability to manage public relations issues. The future of the workforce depends on workers with a certain set of educational qualifications, skills and experience that would most benefit the biotech industry. Different skills are, of course, necessary at different positions in the companies. The managerial level worker needs not only managerial skills, but also a strong science background and understanding of the endeavors that are being pursued at his or her company. Participants mentioned managerial skills, strong science knowledge, and educational skills with relatively the same importance. Specifically, managerial skills were mentioned eleven times, science knowledge was mentioned eight times, and a strong science education was mentioned seven times. It is necessary that all three are present in the managerial candidate, commented a human resources executive at one pharmaceutical company. According to her, “Managers need to be scientists first, managers second. This means at least a Ph.D. with ten years directly relevant experience.” Strong leadership abilities are part of the managerial experience that is

required along with excellent communication skills and technical skills, each mentioned twice. These skills would aid in the strategies of companies to work cross-functionally, combining the expertise of workers at all levels to consolidate the information and make it usable at all levels. Other skills that would be beneficial, and were mentioned by one respondent each, would be sales expertise, cross-cultural interaction and the ability to multitask in a rigorous environment.

According to the respondents, the professional level required about the same emphasis on science and education but does not necessarily require managerial experience. Strong education was mentioned seven times and thorough science knowledge and experience was mentioned six times. The qualities of a high-quality life sciences professional encompassed a wide range of skills. First of all, five interview subjects mentioned that the professional must have a good base of general, interdisciplinary experience in the field. The qualities needed were more varied as the definition of “professional” varied at each company. One particular quality that may be more advantageous would be the ability to work cross-functionally, mentioned three times by respondents. Other qualities that were mentioned once included general problem-solving ability, ability to commercialize a product, and overall cognitive agility. Demonstrated success and evidence of these qualities would make the professional job candidate stand out by showing his or her overall accomplishment in an area of specialty.

Like the professional job candidate, the candidate at the technician level must have both a strong education and a good science background. Education was mentioned five times and science was mentioned three times. The skills required for this position are also varied; however general experience and computer skills were by far the more

specific qualities companies were looking for, mentioned six times and four times, respectively. Computer skills will become more and more necessary as some experiments become executed on computers instead of in the laboratory, according to another human resources director at a biomedical research company. Other more specific qualities, mentioned twice, were good work habits, knowledge of equipment and experiments. Sales expertise, ability to work cross-functionally, and good communication skills were each mentioned once. As the president of a biosciences company said, technicians need to be skilled and knowledgeable about the experiments they're conducting; their knowledge and understanding is necessary for any company to succeed.

In the interviews, staff asked about certain skills that might be lacking at the interviewees' companies. The people they spoke to highlighted a few traits that are essential for jobs, yet were missing to some degree. At the managerial level, the most common deficiency was a lack of practical experience, mentioned four times by the respondents. Interviewees said that although workers proved to be educated enough, they didn't have the specific skills or experience with certain types of research or science that they needed. Once a certain level of educational achievement was reached, the more important thing became one's work experience. One executive said:

We don't have enough scientists. We don't have enough engineers. We don't have enough scientists and engineers who know how to manage. It's scary to me. It's really scary to me.

Examples of some missing fields of experience are engineering, pharmacodynamics, and pharmacokinetics, each mentioned once by certain executives. Pharmacodynamics is the study of the effects of drugs on the body and pharmacokinetics explores what the body does to the drug. With the development of new drugs at many of these companies being a constant objective, it is important for prospective managers to have some experience working in these fields, whether that is in the classroom or at a job. Of course, as stressed by one respondent, at the managerial level it is also necessary for workers to be able to work with people effectively and be able to communicate with them. In addition, this manager mentioned the ability to work cross-culturally, to react to changes in the market, knowledge of technology, new thinking and willingness to grow and develop.

At the professional level the specific scientific experience can also be lacking in the same areas. One biotech president pointed out that communication skills were also deficient in some cases, especially since many companies are hiring scientists from foreign countries or in foreign countries. Two, respondents mentioned the importance of communication skills. Other missing skills also mentioned twice were the ability to work cross-culturally and practical experience. One aspect of this cross-cultural awareness included a global awareness so that employees understand where one's company stands in relation to others. The ability to adapt was cited as necessary at the managerial and the professional levels to meet the needs of this changing landscape. Other skills that were mentioned by individual respondents were the ability to put a business in a global perspective, knowledge of technology, new thinking and willingness to grow and develop.

At the technician level, more general skills were mentioned, such as technical training, math skills, computer skills, and practical experience, especially with the speed of technological development. According to four companies, specific scientific experience was mentioned as a particular shortage at the technician level. One respondent stated that technicians needed to focus on improving their communications skills to make the workplace more manageable and effective, especially due to the cross-cultural environment at many of these companies.

Describing the characteristics of an effective life sciences manager proved to be more wide-ranging in terms of responses, yet two traits stood out above the others. An effective manager in the life sciences must show leadership through his or her ability to manage teams and must be able to effectively mix business knowledge with science knowledge to improve the company. Seven responses specified leadership skills as necessary and five mentioned the importance of mixing science and business knowledge. Four respondents also mentioned the ability to react to change effectively. Like managers at other businesses, they must be able to communicate effectively, multitask, and have general people-skills to make the company more successful. These skills were mentioned three times. They must be able to incorporate all levels of the business and make them feel like they are all part of an important endeavor. Other important traits that were mentioned included:

- Ability to motivate staff
- Strong listening skills
- Passion for their job
- Understanding of the industry

- Technical expertise
- Self-motivation
- Ability to share credit with all those involved

Though these characteristics would remain important in 2017, others would arise as the business environment changes. A general ability to manage change would be necessary, as would the ability to manage remotely. These skills were mentioned three times. Many professionals already work remotely on occasion, but this is expected to increase significantly by 2017. This would also warrant a sense of creativity in learning how to maneuver oneself with a changing and mobile workforce. One thing that respondents mentioned as already posing a problem to biotech companies is the ability to retain employees. Many managers and professionals expect that by 2017, the workforce is going to be even more mobile. For example, one human resources director said...

People are staying at a job for fewer and fewer years, and how do you retain that knowledge? You know, finding ways to retain that knowledge in a really mobile workforce I think is going to be another key skill set that people don't worry about too much right now, because they have about a three year time frame where they have employees. But I think it's just going to be getting less and less.

The business environment and workers must mutually adapt to one another as conditions change. By 2017, other characteristics that will be necessary will be:

- Maintaining a competitive edge
- Dealing effectively with outsourcing
- Working cross-culturally

- Communication skills
- Generally be smarter and faster in dealing with issues that come up

According to four companies, the effective life sciences professional must, most importantly, have a strong educational background, including a broad knowledge of computers and other resources. Two of the respondents stated that the characteristics of an effective professional are the same as that of the manager, such as strong communication skills, ability to adapt to change and ability to mix science and business knowledge. Other characteristics of effective life sciences professionals that were mentioned by a single company included:

- Commitment to their job
- Being well-connected
- Stability at their job
- Being a team-player
- Broad knowledge beyond science
- Being resourceful
- Ability to work with teams effectively
- Ability to set and meet goals
- Passion and direction
- Competitiveness
- Not afraid of challenges

In 2017, the same characteristics will apply, but, as mentioned by three respondents, the ability to work cross-culturally on a global level will become even more important. The rest of the characteristics were mentioned once.

Professionals in 2017 will need to be more prepared to meet the job requirements as the job market becomes more competitive, so they will need to learn how to effectively market themselves to employers. They should be problem solvers, with the ability to work remotely while being able to set and meet the goals they have set for themselves. The life sciences professionals of the future will thus need to be more effective at their jobs and be able to balance the many skills that will be needed. Other effective skills include:

- Having general experience
- Quicker reaction time
- Having a vision for themselves within the company

According to seven companies, the most important trait for the effective life sciences technician to have is strong technical knowledge, which they can apply to experiments they execute. To do this, they must have a strong science education, including good computer skills and problem-solving skills. A solid science education was mentioned three times, computer skills were mentioned twice and problem-solving skills were mentioned once. Other characteristics of a strong technician mentioned once included:

- Hands-on lab experience
- Creativity
- Ability to see the bigger picture
- Competence
- Social skills
- Broad knowledge beyond science

- Ability to multitask
- Networking ability
- Competitive and ambitious
- Hard-working
- Ability to follow directions
- Ability to work independently

By 2017, some things are expected to change for technicians, but the general skills were predicted to generally remain consistent. Education (mentioned four times) and technical/computer skills (mentioned seven times) were by far the more dominant characteristics required. However, it was the non-scientific skills that were predicted to most likely make a difference between prospective employees to employers. Some of these skills included:

- Ability to work with less supervision
- Communication skills
- Ability to be multifunctional
- Commitment to the company
- Ability to adapt to change

Leadership and Skills Gap Analysis

In describing characteristics of good life sciences workers both now and in 2017, several interviewees mentioned broad knowledge as a good skill set to have. Staff asked if leaders in their companies had a broad span of knowledge that crossed beyond the scientific. Out of eighteen responses, thirteen said yes and four said at least some do. Only one person said no. Overall, the dominant trend was that managers and

professionals do know how to balance their knowledge within the company, both scientific and otherwise.

Most importantly, future leaders will need to have the ability to mix science and business knowledge and the ability to manage personnel effectively. These abilities were mentioned five times each. Some respondents were worried that managers would only have scientific knowledge and would not have any training on how to manage a business or personnel. Other skills for leaders mentioned by two respondents each included marketing skills, ability to set goals, and communication skills. Future leaders should also have the following skills, each mentioned once:

- Ability to apply life experience to avoid making mistakes
- Problem-solving ability
- Desire to work hard
- Commitment to job and company
- Vision and goals
- Global mindset
- Honesty
- Innovative
- Technical skills
- Ability to work with the media

Future leaders at these companies will most likely be found either within the company or at other companies in the same industry. Respondents mentioned looking within the company eight times and at competitors seven times. As quoted earlier,

biotechs often “end up stealing from one another to get the talent they need.” Other options that were mentioned include:

- Universities
- Recruiting agencies
- Globally
- Other companies outside the industry
- Throughout the United States
- Advertisements in newspapers or job websites
- College graduates

Although many companies were adamant in saying they had the people with the skills they needed, some companies were actually very worried about finding qualified employees. Out of seventeen total responses to this question, eleven companies claimed to have no trouble in finding people, while three said they mostly were able to find what they needed. Three companies said they weren’t able to find people with the skills they needed. Of those three companies, the shortage was in mechanical skills, molecular diagnostics, and the biological sciences. Other specific skill shortages included:

- Managing budgets
- Regulatory skills
- Clinical laboratory scientists
- Med techs
- Innovation
- Engineering
- Software

- Electrical
- Mechanical
- General management skills

Education Report Card

Part of the problem with providing adequately prepared workers to businesses lies in the quality of education provided at educational institutions, from the elementary to the university level. When staff asked the hiring managers and human resources professionals about what kinds of schools have provided the skill needs required at their companies, the clear frontrunner was four-year colleges and universities, cited eleven times as minimum qualifiers for jobs at their companies. Depending on the position, some also answered that a master's degree (three respondents) or a Ph.D. (four respondents) would be required, especially in the future. Three companies answered that community colleges could provide workers for some less specialized positions. Three others answered that education was not the prevailing category that they look at when hiring new employees; previous and applicable experience could also count as much.

The overwhelming favorite educational institution that met the skill needs of respondents was University of California San Diego (UCSD), cited seven times. The frequency of this response derived from the fact that UCSD has a large life sciences program and is in close vicinity to many of the biotech companies in San Diego. San Diego State University (SDSU) was mentioned five times as an effective education provider, especially when referring to more technical jobs or jobs not directly linked to medicine. Two respondents mentioned University of California Irvine and University of California Berkeley. Other colleges that were mentioned include:

- University of California Los Angeles
- University of Virginia
- University of Southern California
- San Diego City College
- University of San Diego
- University of Texas Austin
- Stanford

Staff asked if any educational institutions had proved to be inadequate in training the respondents' employees. Out of fourteen responses to the question, twelve did not mention any institution. One respondent mentioned Rand Systems Incorporated and another respondent referred to the general quality and progressiveness of the engineering teaching that is available at all universities. One manager that staff spoke to mentioned that Rand Systems Inc. just was not able to turn out the kind of qualified people that it was supposed to. Staff also spoke to a CEO of a business that specializes in environmental services. She referred to some schools not providing an engineering education that keeps up with the times and technological developments. She said:

Basically the education at universities is on two things. One is the quality of the engineering education that they get, and the other is how progressive they are in adopting new and different technologies that they teach. And there are just a lot of universities that don't move along with the times very quickly. You can see that a lot in the way that they teach their GIS, geographic information systems technologies, you can see that in how they teach their storm water management and you can also see

how they teach the basics of where the field is going. We still have a lot of universities who basically feel nothing has changed since the 1960s ...it depends on how forward thinking the school is.

While most schools are probably preparing students with the new knowledge that is needed for future jobs, keeping up with technology and innovation in the classroom is essential for students to get the advanced education they need to be competitive in this field.

In discussing which specific schools will meet their needs, UCSD (six respondents) and SDSU (two respondents) were mentioned most. Most answers lie within the UC and Cal State system, although one respondent each also mentioned the University of Southern California, University of San Diego, and National. Additionally, community colleges were described as having an important role in developing workers without a four-year degree, especially at the lab tech level. Community colleges in general were mentioned twice. As one CEO told me,

It has to be the community colleges. These people can't afford to go to Harvard. It has to be the community colleges that take up the challenge of providing what used to be in the high schools, of like the trades, the trade skills. Those trade skills have to be upgraded to provide the people with the basic skills to come into this new workforce.

In order to make sure that individuals are prepared for the skilled jobs of the future, respondents mentioned that some changes needed to be made so that education can adequately prepare students for those jobs. The biggest concern of the respondents was that there is an alliance between business and education to ensure that schools will be able to prepare students with the skills they will need for jobs in the future. Five

respondents mentioned this as an important solution. Five companies also stressed that educational institutions must provide students with research opportunities and work experience. Another concern raised by two respondents was that students were not getting a good enough education in the sciences, especially at the elementary level.

Three other respondents stated that sufficient funding and financing of education was also a concern, affecting the quality of education that is available. Other educational concerns that were mentioned once included:

- Getting students interested in math and science
- Focusing on math and science
- Fixing the curriculum
- Focusing on communication
- Focusing on writing skills
- Focusing on trade skills
- Parents' roles in education
- Making higher education more affordable

Primary Concerns & Key Message From Industry

Major concerns of the life sciences professionals were wide-ranging. The most common concern, stated by five respondents, was the quality of science education. With the structure of the workforce changing so much, it will be important for employers to be able to manage the issues that this brings up, especially the issue of retiring Baby-Boomers and the ability to relocate if necessary. The problems associated with retiring Baby-Boomers were mentioned three times. Relocation issues were mentioned twice, with one specific reference to the cost of living in San Diego. Finding enough skilled

workers, especially within the United States was a major priority of many of the respondents. Immigration prohibitions add to the complexity of hiring qualified foreign workers. Having enough skilled workers was mentioned twice, but this also relates to immigration prohibitions and legal expenses in hiring foreign workers, each mentioned once. Other concerns mentioned once include:

- Developing applicable lab exercises
- Ensuring adequate budgets
- Training opportunities
- Decreasing size of available workforce
- Strong work ethic
- Commitment
- Quality of education
- Funding

The specific problems suggested, such as a lack of interest in becoming a bench scientist did not really seem to warrant much concern. Although some respondents said it could potentially be a problem, most answers pointed out that many bench scientists enjoy that work; it is just difficult to keep them at that position. Specifically, out of eleven responses, six respondents said there wasn't a lack of interest in becoming a bench scientist and two said there was. Three said they did not know.

As for making quick changes to the education system, it seemed respondents thought that nothing is quick with education because of the bureaucracy that surrounds it. Out of ten responses, six respondents thought making quick changes was not likely, three didn't know and one thought that it was possible. The quickest solution that was

suggested was financial contributions to faculty doing new research. But they acknowledged that this solution still didn't fix any of the problems associated with the structure of higher education. The respondent who said needed changes could be made quickly believed that the media could do more to rouse awareness of the problem. The disconnect between education and business was acknowledged and seen as a problem that can hopefully be remedied through outreach like the work the San Diego Workforce Partnership is doing.

There does not seem to be a lack of training for professionals and management. Out of eight responses, seven said there wasn't a lack of accessible training. The problem was that it wasn't accessible or seen as accessible. One suggestion for making training seem more accessible was for it to be made a priority at the top of the company so that personal growth becomes a priority for the company as a whole.

There were mixed responses to the point concerning whether or not there was a lack of understanding by educators of what was driving the life sciences industry. Out of seven responses, three said there was not a lack of understanding and two said there was. Two didn't know.

Largely, there was not too much concern about a lack of math or science skills in positions that specifically require those skills. Respondents generally stated that the workers in those jobs have those skills. Out of eight responses, five said there wasn't a lack of math and science skills, two said there was, and one said there was a lack of math skills. Two respondents said that if a problem exists at all it is with non-science workers not understanding or knowing basic math and science.

The key message concerning the workforce that a majority (11 out of 13) of the life sciences professionals emphasized was the importance of education in preparing students and workers for the advancements of the future. Innovation and technology are such an integral part of the life sciences; they must be addressed at all educational levels, from elementary school through college. Along with education, three respondents stressed that appropriate training has to be available to workers so they can develop the skills they need to improve the company. Access is key in both education and training. Quality education has to be available to all students at all levels to be able to compete with countries like China and India. Training also has to be a priority for business at the management level so employees will feel rewarded for their effort.

Conclusion:

Because the biotech industry is such an important economic driver for the San Diego area, it makes sense that we try to provide potential workers with the information they need to be as qualified as possible. Now is the time to stop and focus on what is lacking in the critical connection between education and business. Workforce development through the WIRED program seeks to make the innovative changes that are needed in providing workers with good-paying jobs and providing businesses with workers who are qualified with the skills they need. The suggestions provided by the businesses as to qualities and skills they look for need to be incorporated into educational curricula as well as incorporated into what we teach our clients. Workforce development, with adequate resources, can be the link between business and education.



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