

# Nevada Information and Communications Technology Focus Group Analysis Report



**College of Southern Nevada**



**Truckee Meadows Community College**



**Western Nevada College**

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## Executive Summary

This study was commissioned by the College of Southern Nevada through its Department of Academic Affairs and Executive Director of Technical Programs & High School Partnerships, Warren Hioki, Ph.D. It was funded through BATEC (Broadening Advanced Technological Education Connections), the National Science Foundation Advanced Technological Education Program's National Center for Computing and Information Technologies. BATEC's efforts in curriculum, outreach and research reflect the demands of the 21st century workplace. BATEC is working in the urban areas of Boston, Chicago, San Francisco and Las Vegas to define, extend and strengthen computing and information technology pathways and career opportunities; facilitate and leverage strategic partnerships with education, business, government and community to build awareness, generate interest, and support learning opportunities; conduct actionable research to inform policy makers, IT educators and workforce development agencies; and participate in and lead the national discussion on the subject of integrated curriculum and applied IT.

The purpose of this research is to support the College of Southern Nevada (CSN), Truckee Meadows Community College (TMCC) and Western Nevada College (WNC) initiatives by reaching out to employers and other organizations to describe knowledge and skills needed by information and communications technology (ICT) workers; describe the current and projected employment opportunities for technicians; describe industry perceptions of colleges and community college graduates as potential employees; and to provide an update of the 2007 Nevada Information Technology Education (NVITE) Workforce Study report.

In terms of methodology, the study engaged in triangulation, in that multiple modalities were employed, incorporating varying types of data and methods of data collection. Triangulation increases the confidence in the results produced in the research.

This research consists of primary data collected during two face-to-face, community outreach focus groups held on May 17 in northern Nevada and May 18, 2012 in southern Nevada. Focus group sessions lasted two hours. A total of 84 participants attended the focus groups, and the sessions were held in the following locations:

- Reno, Nevada, 29 participants
- Las Vegas, Nevada, 55 participants

Several employment opportunities and skill needs emerged from this research including mobility, cloud, big data and convergence of technologies. Focus groups found community colleges to be a valuable resource in preparing the workforce. However, industry participants found candidates to be only somewhat prepared for employment and would like additional preparation to include a broad understanding of ICT in addition to specialized skills and improved communication, teamwork, writing, and problem-solving skills.

In addition, focus group participants indicated a desire for the community college sponsors of the study to follow up on ICT certifications and portable credentials, particularly in project management and services management. Further development of internship programs, with more information on procedures to implement them, would be welcomed by industry partners.

Faculty in attendance worked in teams to reflect on four high-level recommendations from the 2007 report, and the actions that have been taken with respect to those recommendations. Three of the four recommendations have had at least some action taken, with positive impact on the system and students.

While these were raised as priorities, it will be up to the colleges to decide which initiatives will be most beneficial and the most feasible.

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## Introduction

This study was commissioned by the College of Southern Nevada, through its Department of Academic Affairs and Executive Director of Technical Programs & High School Partnerships, Warren Hioki, Ph.D. It was funded through BATEC (Broadening Advanced Technological Education Connections), a National Science Foundation-funded Center for IT (Information Technology) Education. The Center's purpose is to develop career-focused pathways to high-technology education and practical work experience for motivated, typically underserved high school, community college and university students. One of urban areas of the BATEC National Center is Las Vegas, because of the high-demand for skilled labor coupled with great opportunities for building new connections in skills training and workforce development. The College of Southern Nevada (CSN), Las Vegas, partnered with colleges in northern Nevada including Truckee Meadows Community College (TMCC) and Western Nevada College (WNC). A major goal in of BATEC and the community colleges involved in this study is to build regional cooperation among the ICT companies and the educational institutions that train workers.

According to the *Bureau of Labor Statistics, Occupational Handbook, 2010-11, Overview 2010-20 Projections*, computer and Information Technology occupations will grow nationally by 22% over the next 10 years, with over 74,000 new jobs added each year. It is projected that 38% of new jobs will be middle skill jobs. Middle skill jobs are defined as "Jobs in the middle of the labor market – those that require more than high-school, but less than a four year degree" by the Urban Institute in its report, "America's Forgotten Middle-skill Jobs", November 2007. The projections for Nevada are in line with or greater than the national averages. This report focuses on middle skill jobs.

## Purpose of Research

The purpose of this research is to support the College of Southern Nevada, Truckee Meadows Community College and Western Nevada College initiatives by reaching out to employers and other organizations to describe knowledge and skills needed by information technology workers; describe the current and projected employment opportunities for technicians; describe industry perceptions of colleges and community college graduates as potential employees; and provide an update of the 2007 report, NVITE Workforce Study. Because communications has converged so strongly with information technology, this report will use the term ICT (Information and Communications Technology) to describe more accurately the middle skill jobs and the technicians that fill them.

## Study Objectives

Conducted by The Allison Group of Seattle, Washington, this research was guided by the following research objectives:

1. Bring together industry and education to discuss community college education from the perspective of employers.
2. Describe the current and projected high demand jobs in the information technology sector in Nevada.
3. Describe the job and competencies required for eligible workers to fill current and projected employment opportunities in the information technology sector in Nevada.
4. Update the study conducted in 2007.

## Methods

### Triangulation

In terms of methodology, triangulation was employed in the SMART Center Workforce Study in that multiple modalities were employed in three dimensions of triangulation, as follows:

- *Data triangulation:* Multiple people were asked similar questions over a 2-month time frame and in multiple locations across the state of Nevada in both private (interview) and public (focus group) settings.
- *Methodological triangulation:* Multiple methodologies were used to gather data, including observations, surveys and focus groups.

As a way to check or verify results, the research technique of triangulation is well respected. When use of different methods of data collection and different types of venues leads to similar results and findings, the confidence level in those findings increases. If results are not similar, then areas for further research are quickly able to be identified.

The purpose of triangulation is that, by utilizing a variety of methods, instruments and settings, any biases or weaknesses of the study may be reduced so that quality results and findings are produced.

### Focus Groups

This research consists of primary data collected during face-to-face, community outreach focus groups held on May 17 in Reno, NV (northern Nevada) and May 18, 2012 in Las Vegas, NV (southern Nevada). Focus group sessions lasted two hours. A total of 84 participants attended the focus groups, and the sessions were held in the following locations:

- Reno, Nevada, 29 participants I think this is reversed
- Las Vegas, Nevada, 55 participants

The target audience for these sessions included the following groups and stakeholders:

- Employers in ICT or ICT-enabled companies
- Governmental agencies
- Education and training institutions, including northern and southern Nevada high school districts
- Economic development agencies

Table 1 below shows the attendance profile of each of the focus groups.

	Reno	Las Vegas	Combined
Employers	15	31	46
Governmental agencies	4	4	8
Education and training institutions	10	19	29
Economic development agencies	0	1	1

The Las Vegas focus group was comprised of 65% business/government and 35% educators and the Reno focus group was 66% business and government and 34% educators.

The focus groups represented a broad distribution of companies, products and services in ICT. The top three were Telecommunications, Data, Analytics and Intelligence, and Equipment and Hardware. Table 2 shows the distribution of participants according to descriptions of company products and services.

	Reno	Las Vegas	Combined
Equipment and Hardware	<b>70.0%</b>	39.1%	48.5%
Telecommunications	50.0%	<b>60.9%</b>	57.6%
Data, Analytics and Intelligence	50.0%	43.5%	45.5%
Cloud, Virtualization and Storage	20.0%	26.1%	24.2%
Networking, Unified Communications and Mobility	40.0%	39.1%	39.4%
Productivity, Collaboration and Integration	40.0%	34.8%	26.4%
Software, Robotics and Mobile Applications	50.0%	30.4%	36.4%
Security, Privacy and Integrity	40.0%	34.8%	36.4%
* participants selected all that apply			

The Reno focus group had a predominance of companies involved with equipment and hardware; the Las Vegas focus group had a virtually equal predominance of companies



involved with telecommunications. Reno’s companies were significantly more involved in software, robotics, mobile applications and somewhat more involved with security; Las Vegas companies were more involved with cloud, virtualization and storage. The two areas were roughly equal in networking, mobility, data, analytics and productivity, collaboration and integration.

Table 3 shows the employers and other groups represented by participants attending these sessions.

<b>Table 3: List of Industries and other Groups Represented by the Participants</b>	
ICT Outsourcing	Health Care
ICT Consulting	Utility-Gas & Electric
State Government	Web Development
Broadcast Media	

The focus group questions are found in Appendix 1. Each focus group had a session host and representatives of the BATEC Center in attendance. BATEC Center staff provided support at the focus groups, including small group facilitation and distribution and collection of surveys and materials. Focus group data were then analyzed to identify trends, commonalities and unique findings. The purpose of this procedure was to support data-driven decisions by the Nevada colleges regarding curriculum, resources and prioritization of activities. The results of this process are described in the findings that follow.

## Findings

### Perception of the Community Colleges

Each focus group was asked a uniform set of questions regarding their perception of community college graduates in ICT. Subgroups of 5-7 industry participants were formed, and each group answered the same set of questions, with responses submitted via a template. At least two note-takers were active in each subgroup.

The questions addressed topics:

- Do you currently consider community college graduates when filling openings?
- What shortcoming do you perceive community college students have, compared to other applicants?
- What benefits do community college students bring relative to other applicants?

Stark differences between the northern and southern Nevada were uncovered by the focus groups, with the exception of competencies, knowledge and skills. The following section of the report contains the data from each focus group. Comments as they were submitted were compiled and then summarized to remove redundancies and references to specific companies.

**Community Colleges Focus Group Perception Data: Reno**

Table 4: Career Pathways Perception Data, Reno
<p><b>Do you currently consider CC graduates when filling openings?</b></p> <p>No – they need more business skills            Yes –if we like them in the interview and they have soft skills            The economy has more available qualified candidates today            At the interview with a community college graduate we find a well likeable approachable interview in an AA degree holder who is career minded, a self starter, continued personal projects and willing to take feedback and improve to get the job.            Perceive value of BA vs. AS degree for employer; 4 year degree is often the minimum standard</p> <p>It depends on Position. For entry level</p> <ul style="list-style-type: none"> <li>• More business skills</li> <li>• Entry level 2 certs equivalent to degree/intelligence</li> <li>• Trainable new employee</li> <li>• Higher qualified people pool vs. community college grads</li> <li>• Internship programs</li> <li>• More practical</li> <li>• (career oriented) Invested inspired motivated</li> </ul> <p>Yes for entry level</p> <p>Yes, we look for attitude and willingness to work and learn</p> <p>Preconceived stereotypes; Don't think of tech necessarily; can you get quality out of CC?            Depth/breadth versus 4 year college: 4 year more theoretical vs. applied use (CC students)            Not perceived as a source for technical talent</p>
<p><b>What shortcomings do you perceive CC students have compared to other applicants?</b></p> <p>Lack of depth in specific skill</p> <p>We need people with projects not just classes</p> <p>Need greater interpersonal skills, perseverance, patience; Need more solution oriented skill sets; Need more soft skills to compete with the 4-year degree Need more technical writing skills</p> <p>Teach them to be in the job then they leave</p> <p>Need more exposure to legacy systems</p> <p>At TMCC students need documentation of skills</p> <p>TMCC the pace is different than industry</p> <p>Students need more practice</p> <p>Less experienced employees with training move on</p> <p>May not be as well rounded as a 4 year student; May not have the experiential skill sets provided that a 4 year school might provide</p>

**What benefits do community college students bring relative to other applicants?**

Self disciplined  
Structured learning  
More rounded training broader range of skills  
Students working and going to school better work ethic and ambition  
Taught by instructors that are less academic and more practical  
Potentially more hands on experiences through internships  
Focus, motivated  
Raw/Blank slate → don't have bad habits; more teachable

**Community Colleges Focus Group Perception Data: Las Vegas**

**Table 5: Career Pathways Perception Data, Las Vegas**

**Do you currently consider CC graduates when filling openings?**

Yes, with relevant Degree/ Clinical  
IT  
Engineering Technology  
Software  
ET/Theater Tech  
Yes, We hired 3 through the internship program; Yes if no one with experience is available  
Definitely. All positions require a 2-year degree minimum  
Yes, If they have both hard and soft skills  
Certification is good but having a good work interest is important

**What shortcomings do you perceive CC students have compared to other applicants?**

Non-transferrable  
No place for 2 year degree student to get 4 year degree to UNLV  
More lab/Practical experience; lack ability to translate/implement the material  
There needs to be a required internship component  
Problem solving/Logic/Critical thinking not evident  
Basic business education -- what does "above the line" mean  
Need more: Innovative entrepreneur skills; Knowledge management; Management and team dynamics;  
Personal communications skills; Public speaker/presentation skills; Soft skills  
There are missed opportunities for team projects  
Jack of all trades/master of none; need many core discipline courses; need more core/discipline courses  
Specific vendor (CPE) training: Avaya, Mitel, Shoretel, Cisco  
Since many of the students come from the Clark County School District, they may not have developmental skills for the workplace

**What benefits do CC students bring relative to other applicants?**

Generally Local/Won't be moving  
Typically older have some work experience  
More mature candidate in most cases; maturity of students because they work and support themselves during the process  
Possible work experience while attending school; work ethic  
Looking for growth in job opportunities  
Commitment  
Drive to improve; higher desire to learn (e.g. aid off, looking for new skills to re-enter the workforce)  
Lower/Realistic expectations  
Multitasking, time management  
Professors are hands on" and closer to the real world and thus teaching the community college student the real world today.  
Willingness to adapt  
Hands on lab experience.  
Having local presence increases morale in the workplace. No debt from school loan. Can go back to get more training.

It is interesting to note that there was a significant degree of similarity between the comments in 2012 and those in 2007. Both studies found:

The predominance of comments with respect to shortcomings of community college students was in the area of soft skills/employability skills and in particular, oral and written communication skills, problem-solving skills, team skills, and the ability to manage oneself. From the 2007 report: "Whenever we gave employers the chance to tell us what they wished applicants had more of or what they felt applicants lack, technical skills were never mentioned first." The same was true in both 2012 focus groups. Below are the soft skills specified during discussions by the two focus groups:

**Reno:** interpersonal skills, perseverance, patience; Need more solution oriented skill sets; Need more soft skills to compete with the 4-year degree Need more technical writing skills.

**Las Vegas:** Innovative entrepreneur skills; Knowledge management; Management and team dynamics; Personal communications skills; Public speaker/presentation skills; Soft skills.

Once again in 2012 as in 2007, focus groups stated that classroom and teaching methods need to include more exposure to current and authentic problems; curriculum needs to provide students with greater depth and breadth.

In keeping with the 2007 study, concern was expressed that there is no baccalaureate completion path for AAS-degreed students in Nevada. AAS degrees do not transfer to UNLV or UNR, thus preventing technicians from leveraging their technical skills with engineering, management and business skills.

In 2012, some employers are still trending toward more 4-year graduates. The reasons given were consistent with the 2007 and other studies citing that the requirement for a 4-year degree had to do with the employer’s perception that 4-year degree students demonstrate greater levels of soft skills, in particular communication, problem solving and perseverance.

In the 2012 focus groups, there was greater emphasis on work experience and both the Reno and Las Vegas focus groups discussed the need for more internships. During whole-group discussion in Reno, the participants indicated that less than half of the companies represented at the focus group offered internships. It was noted that those companies that offer internships have good connections to the colleges, and those that don’t are lacking in those connections. Companies indicated that they want a single point of contact with the college and want to have a chance to define what they need in an internship. TMCC is setting up a website to match students with internship opportunities. It was also suggested that representatives of the college make presentations at local Chambers of Commerce, Rotary Clubs and Vistage groups to describe how internships work, how to contact the college, and benefits of internships to business.

Also unique to the 2012 focus group is the recognition by companies in both Reno and Las Vegas that the community college student is often older, more mature, working while going to college and thus demonstrates time management, commitment and work ethic.

In 2012, both focus groups also had an extensive discussion on certifications. They became less popular in the 2000’s, but are now, once again, a significant tool for hiring used by large and small companies alike. Companies see certifications as setting a baseline of knowledge. One Las Vegas participant said, “find me someone with a CCNA plus a Project Management or IT Infrastructure Library certificate and they have a job with us.” Some companies commented that their hiring managers are looking for a degree (AA or Baccalaureate) plus one or two certifications. For specialized skills, a certification can be more valuable than a degree.

That said, several participants commented that there are many people with certifications, and some companies are moving to portfolios, which provide a demonstration of work that applicants carry with them. Success in obtaining a job is as much a function of being prepared to communicate about technical accomplishments and provide examples in which the applicant was successful in problem solving, critical thinking, teamwork and self management.

Participants were surveyed regarding the value they place on a specified list of certifications. Their responses are in Table 6 below.

<b>Table 6: Certifications Ratings</b>					
Rating Scale:	4 = Critical	3 = Important	2 = Somewhat Important	1 = Not important	
			Reno	Las Vegas	Combined
A+			2.7	2.7	2.7
Network +			2.7	3.1	2.9
Internet +			2.6	2.8	2.7
CIW			2.6	2.7	2.6
MCSE			2.7	3.3	3.0
CCNA			2.7	3.3	3.1
CCNP			2.7	3.3	3.0
MOUS			2.5	2.6	2.5
Security +			2.9	3.1	3.0
CISSP			2.6	3.1	2.9
PMI (Project Management)			2.9	2.9	2.9

It is significant that none of the certifications listed on the survey rose to the level of critical, and only six of the ten listed certifications were ranked as “important,” and only in Las Vegas. Large group discussions brought forward a number of other certifications that are important to the companies represented. These are found in Table 7 below. It is interesting to note that the only certification the two focus groups both mentioned in discussion was ITIL, which fosters the idea that ICT services must align with business processes and needs. The diversity contained in the certifications named, and the low levels of importance afforded the certifications listed in the survey, suggest that further inquiry with businesses in both regions may prove fruitful.

<b>Table 7: Other Certifications</b>			
	Reno	Las Vegas	Combined
SANS: System Administration Networking and Security Institute	✓		
CHFI: Computer Hacking Forensics Investigator	✓		
GIAC: From SANS Institute, Global Information Assurance Certification	✓		
ISACA: Information Systems Audit and Control Association	✓		
VCDX: VMWare Certified Design Expert	✓		
CCIE: Cisco Certified Internetwork Expert	✓		
COBIT,: Control Objectives for Information and Related Technologies	✓		
MOF: Microsoft Operations Framework	✓		
ITIL: Information Technology Infrastructure Library	✓	✓	✓
MCITP: Microsoft Certified Information Technology Professional		✓	
PMP: Project Management Professional		✓	
ABET: Engineering		✓	
VCDX: VMWare Certified Design Expert		✓	
CEH: Certified Ethical Hacker		✓	
ISCET: International Conference on Sustainable Energy Technologies		✓	
Oracle Certification		✓	

In the large group discussion, the Reno focus group provided information regarding small businesses, stating that smaller organizations hire individuals with broad skills and exposure to as many ICT skills as possible. In a large organization you can afford to have specialists, but in a smaller organization employees need to understand how functionalities interoperate with each other. In particular, they mentioned convergence skills—voice, video—from specialized training to training on individual elements/topics to common elements between the functional areas--skills in a context.

During the large group discussion session in Las Vegas, participants agreed on the general lack of awareness by parents, high school students and the public as to the number of quality jobs in ICT in the Las Vegas area.

## High Demand Jobs

Each focus group was asked about their perception of the Nevada economic environment and their anticipation with respect to ICT and hiring. Participants remained in the same subgroups consisting of 5 to 7 members per group, and each group answered the same set of questions with responses submitted via a template. At least two note-takers were active in each subgroup.

The questions addressed topics:

- What have been the major changes in the Nevada business / economic environment since 2006?
- What does this mean for the future of technology-based or technology-enabled enterprises going forward?
- What are your current near-term and growth and hiring expectations (clerical, professional, technical, other)?

The following section of the report contains the data from each focus group. The comments are presented as submitted by the focus group participants. They were compiled and then summarized to remove redundancies and references to specific companies.

### High-Demand Jobs Focus Group Perception Data: Reno

Table 8: High Demand Jobs Perception Data, Reno
<p><b>What have been the major changes in the NV business / economic environment since 2006?</b></p> <p>IP V6 (Internet Protocol Version 6) skills for new Network Systems.            IP Telephony. Skill sets in basic Networking, telephony and IP communications, Convergence technology.            Different OS Systems, including Linux            Convergence of different software.            Changes from analog system to IP systems and analytics            Education – Casino industry – Need high            Phones and Communications going to IP from digital            Mobile devices are important; Wireless services            Security            Since 2006 virtual shift not with state outside of state work</p> <p>Fewer jobs; Business down            Downsized, Decreased revenue, Better profit margins because more efficient.            People keeping systems longer; Fewer equipment purchases/ longer life cycle            Less churn            Keeping profits and not expanding as quickly</p> <p>More and better applicants; more experienced talent available; Can hire experienced people at lower cost            Little easier to convince people to move to Reno            Outside geography sourcing for senior level talent; local (UNR) sourcing for junior talent, (NOT Community college)            IGT hires directly out of community (local)            Bad political environments changing decisions on funding on large projects            More turnover on jobs with narrower skills sets</p> <p>Hiring directly out of college            Multidimensional jobs; Need employees with diverse skill sets            Pay/reward based on business cycle</p>

Diversified employees stay  
Reward based on business cycle  
Aging workforce  
Cyclic job openings  
Deliverable dotted line reporting

**Table 8, Continued: High Demand Jobs Perception Data, Reno**

**What does this mean for the future of technology-based or technology-enabled enterprises going forward?**

IP V6 skills for New network Systems.  
OS systems – To interoperate between different OS systems.  
Transport Systems  
Research Skills  
Security in high demand in the industry  
Need strong skill set languages  
Skillsets need to be multiple not just specialized  
Need to educate on projected future technology in addition to current  
Need to prepare for convergence of blended technologies  
Mobile will continue to grow

Small number of business' provide risk for new employees

Global outsourcing  
Cost effective relocations  
Remote offices / virtual workforce  
Communication opportunities, phone, email, face to cave, video conferencing  
Relocate from larger cities to smaller outside sources for recruiting  
Local supply reduced  
Professional hiring, entry level, seasoned labor, outsourcing  
Office work outsourced locally  
IRS regulations limiting small business to hire subcontractors vs. employees  
Virtual offices  
Stronger communication skills. Email/Phone/Video/ face-to-face  
Understanding political work environment  
Ownership skills lacking team environment skills

**Table 8, Continued: High Demand Jobs Perception Data, Reno**

**What are your current near-term growth and hiring expectations (clerical, professional, technical, other)?**

Technologist hardware  
Application Specialist in software  
Networking, fiber, transport, ITS Technicians  
Smaller organizations need broader skills.  
New hires will be expected to be more fluid with technology and expected to grow with technology as it expands  
Technical skills will be expected of the front line employee, not just the IT specialist  
Need to be able to research  
Security skill set will be high demand  
Hardware and applications specialist needs to understand how to work with system, even if not networking, fiber, and transport specialist, platform specialist

Hiring senior and junior technical  
Some clerical/ professional  
Some business hiring more, some less but all are growing  
Need to go outside local area for senior talent & get junior level talent locally



Competition for finding workers

Build protégés, build employees from within; hire noncore employees(bookkeeping)  
 Already experienced, proud founders  
 Reduce less skilled employees and keep multi skilled employees  
 Hire contractors

Communication is essential; leadership vs. communication  
 Virtual workforce needed

**High Demand Jobs Focus Group Perception Data: Las Vegas**

<p><b>Table 9: High Demand Jobs Perception Data, Las Vegas</b></p> <p><b>What have been the major changes in the NV business / economic environment since 2006?</b></p> <p>Downsizing; fewer people asked to do more          Fewer people means reduced service quality          Population continued to grow despite unemployment; construction projects terminated mid process          Governor's office of economic Development created 9 months ago              Regional focus on diversifying economy; Identify 7 sectors to specialize in to grow economy- 1 sector is Technology industry.                  Economic – recruitment/retention                  Knowledge base around technology industry and education                  Develop workforce to work in Nevada                  Move from a growth model to efficiency model technology</p> <p>SUAS-Small Unmanned Aircraft System          Globalization/globalization of gaming          Mobile growth Connectivity; Social media          Cloud/Xaas          Changing consumer behavior/Big data          Economic recession impact on Vegas largest industries              2006 – 2008 – Glide path down: decrease in hiring              Downsizing Casinos              Construction Downturn; Housing Downturn              The slow growth within recent years has slowed the opportunity to expand technology          Ubiquity of access/Hyper connectivity          On web 2.0 jobs          Engagement vs. record</p> <p>Nevada is ranked 50 in the nation in education. A strategy should be to develop a change cross culture FITT (Forum for International Trade Training) in education and industry to foster a group K-12 program and monitor industry needs for an aging workforce</p>
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<p><b>Table 9, Continued: High Demand Jobs Perception Data, Las Vegas</b></p> <p><b>What does this mean for the future of technology-based or technology-enabled enterprises going forward?</b></p> <p>More business diversification; not just entertainment/casino          More “mobile”; location not specific – favors small enterprise          Major leaps for small resources; not corporate          Big business minimizing risk; going to smaller sources</p>
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<p>Continuous innovation  Colocation of partnership  Community leadership skills  Moving from systems of record to systems of engagement  Architecture is changing  Outsourcing IT functions  Structural Theory; Systems of engagement design theory; Architectural Theory</p> <p>Workforce increasing for technology employers  Greater focus by workers on technology  Business is leveraging IT technology to do more with less</p> <p>Employees' must have: Communications; Customer service; Troubleshooting; Ability to learn and adapt;  Long term specialization goals</p>
<p><b>What are your current near-term growth and hiring expectations (clerical, professional, technical, other)?</b></p> <p>Clerical lowering  Professional growing (especially project management structure/delivery structure)  Technical lowering</p> <p>Being in a holding pattern due to economic and political uncertainty and risk adverse environment  Government is still hiring to maintain basic service level  Nonexistent growth for the year</p> <p>Innovation, entrepreneurship  IT service management  Adaptation &amp; differentiation  Building businesses on cloud services; building business processes by customizing cloud services</p> <p>Tech support churn rate 33% year over year  We are losing 40% of our experienced workforce within 25 years the recruiting should start early (K-12)  We need experienced personnel that have been trained prior to coming to the workplace</p>

Similarities in responses between the two regional focus groups included the economic downturn and slow recovery, with the attendant downsizing, fewer equipment purchases, and decrease in expansion of technology. Both groups mentioned that the pool of applicants is better than during boom times, with more experienced talent available and the ability to hire at lower wages.

In terms of hiring expectations, both focus groups indicated that the ICT technician of the near future will be one who can adapt, demonstrate fluidity with technology and who possesses the ability to grow with technology as it changes. The ICT technician will also need to have a broad base of knowledge and skills along with specialization and be able to work with the system, even if they are not a systems specialist.

Both groups also discussed the impact of mobility and mobile devices. They anticipate that the changes in mobility technology will change the way business is conducted will change in terms of non-specific locations, favoring of small enterprise and transfer of risk to smaller sources.

There were several noteworthy distinctions between the responses for the Reno and Las Vegas focus groups, as follows:

- The Las Vegas focus group has a military component to its economy, in particular the development of SUAS, Small unmanned Aircraft System. This is expected to grow and will require numerous technician positions.

- The Las Vegas focus group emphasized building businesses on cloud services and building business processes by customizing cloud services as a growth area. This requires knowledge of cloud computing and particularly knowledge of XaaS (Services).
- The Las Vegas focus group also indicated that the movement from systems of record to systems of engagement will play a role in technology and technology-enabled companies in the future. Systems of record are the common to enterprise resource planning systems and have an emphasis on accuracy and integration of data. Systems of engagement are used directly by employees for "such things as email, social networking, and on-line training. Employees engage with these systems. Different skill sets will be required for systems of engagement.
- The Reno focus group emphasized communications, including internet protocol (and the IP V6 skills needed for new network systems), telephony and convergence of technologies and software. While networking fiber and transport were mentioned in Las Vegas, the Reno group stressed the importance of how voice and data are transported and the skill sets required for transport systems.
- The Reno focus group also made the point that the jobs of the future for ICT technicians will be more multi-dimensional and will require skill sets that are both broad and specialized.

## Competencies, Knowledge and Skills

Focus group participants in both Reno and Las Vegas completed a comprehensive survey of knowledge and skills. This survey was developed by SIGITE, Association for Computing Machinery's Special Interest Group for Information Technology Education. The study's funder, BATEC, strongly urged that this survey be utilized. For the Las Vegas focus group, the category of hardware was added by the Executive Director of Technical Programs & High School Partnerships based on his knowledge of the Las Vegas ICT market and companies.

Table 10 lists the categories of knowledge and skills in the survey, with the summative weighted average for each category for each focus group separately and the two focus groups combined. Participants were asked to rank each skill as critical, important, somewhat important, and not important. Each ranking was given a number as follows:

Critical = 4  
 Important = 3  
 Somewhat Important = 2  
 Not Important = 1

The weighted averages were derived using these values. The averages for the categories are shown in Table 10.

Rating Scale: 4 = Critical 3 = Important 2 = Somewhat Important 1 = Not important			
	Reno	Las Vegas	Combined
Information Technology Fundamentals	2.7	2.4	2.5
Human Computer Interaction	2.9	3.1	3.1
Information Assurance and Security	3.0	3.2	3.1
Information Management	3.0	3.1	3.1
Integrative Programming and Technologies	2.8	3.1	3.0
Math and Statistics for IT	3.1	3.2	3.2
Networking	3.0	3.3	3.2
Programming Fundamentals	3.0	3.0	3.0
Platform Technologies	3.0	3.0	3.0
System Administration and Maintenance	3.2	3.3	3.2
System Integration and Architecture	3.3	3.4	3.4
Social and Professional Issues	3.1	3.1	3.1
Web Systems and Technologies	3.0	3.2	3.1
Hardware	n/a	3.2	3.2
Wireless	3.0	3.1	3.0
Business/Non-Technical	3.7	3.7	3.7

Most of the knowledge and skills on the survey were rated as important. Information technology fundamentals were rated as somewhat important, and pervasive themes in IT, history of information technology (which received the lowest rating of all knowledge and skills on the survey), IT and its related and informing disciplines and application domains.

Most notable is the one group of knowledge and skills that were rated as critical by all participants, in both focus groups: Business / Non-Technical. In the survey, this includes the employability, or soft skills, and stands out with a ranking heads and tails above all the others. This group included troubleshooting, communications, workplace ethics, attitude/stewardship, problem solving and teamwork. These same skills were brought up frequently in the focus group discussions and on the templates collected with notes from the small group discussions. Once again, this result is the same as that found in the 2007 report.

The following pages present weighted averages for the subjects contained within the topical areas reflected in Table 10.

There is significant consistency between the rankings made by companies in Reno and in Las Vegas, with most of the rankings within .3 of one another between the two focus groups. There were some variances greater than .3 as follows:

		Reno	Las Vegas	Difference
IT Fundamentals	History of Information Technology	2.4	1.5	.9
Human Computer Interaction	Human Factors	3.0	3.4	.4
	HCI Aspects of Applications Domains	2.5	2.9	.4
Security	Forensics	2.7	3.1	.4
Integrative Programming	Inter-Systems Communications	2.9	3.3	.4
	Data Mapping and Exchange	2.9	3.3	.4
	Software Security Practices	3.0	3.4	.4
	Applications Areas	2.9	3.5	.6
Programming Fundamentals	Fundamental Data Structures	3.3	2.9	.4
Web Systems & Technologies	Digital Media	2.8	3.3	.5
	Social Software	2.5	2.9	.4
Wireless	Microwave/Radar	0.0	2.8	2.8
	RF Principles	2.7	3.1	.4

The largest differences were found in Microwave / Radar, with no Reno respondents ranking that particular topic and History of IT, which received exceptionally low ratings from the Las Vegas companies. The most topics with large differences between the two regions were in the area of programming, with Las Vegas clearly valuing those topic areas more than Reno. The one exception is Fundamental Data Structures in Programming Fundamentals, which likely is not of sufficient depth for the Las Vegas companies. Reno participants did not rank Wireless nor Web as highly as Las Vegas. One interpretation of these differences between the North and South regions may be that there are more larger companies in the South, which would have more tightly defined and specialized roles for technicians. In the North there are more smaller companies in which technician need to fill multiple roles. This may be an area for follow-up by the colleges.

The section below shows the ratings for all topic areas. Charts are provided for those categories rated by both focus groups and receiving a combined rating of 3.2 or higher. The tables below and the accompanying charts show the relative importance of subject areas within the major IT topic categories, and can provide guidance as to prioritization of topics taught.

Rating Scale:	4 = Critical	3 = Important	2 = Somewhat Important	1 = Not important	
			Reno	Las Vegas	Combined
<b>Information Technology Fundamentals</b>					
			2.7	2.6	2.6
			2.4	1.5	1.9
			3.1	2.8	2.9
			2.8	2.7	2.7

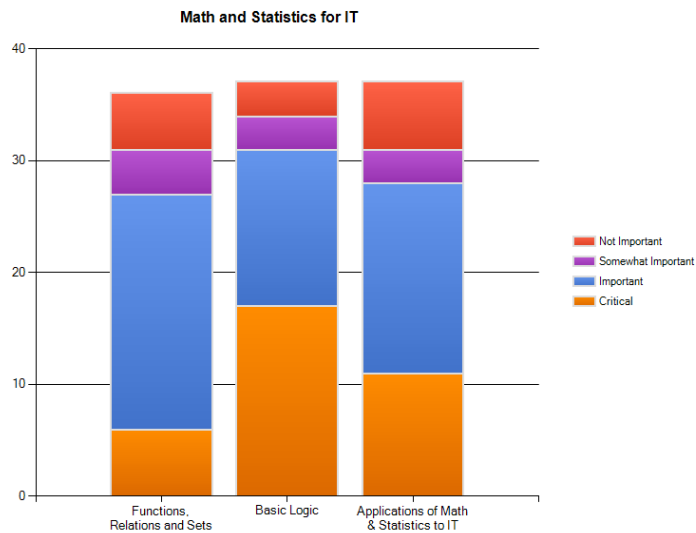
			Reno	Las Vegas	Combined
<b>Human Computer Interaction</b>					
			3.0	3.4	3.2
			2.5	2.9	2.7
			2.9	3.0	2.9
			2.8	2.8	2.8
			3.5	3.8	3.7
			2.9	3.0	2.9

			Reno	Las Vegas	Combined
<b>Information Assurance and Security</b>					
			3.2	3.1	3.1
			3.2	3.2	3.2
			3.0	3.3	3.2
			2.7	3.0	2.9
			2.9	3.2	3.1
			2.7	3.1	3.0
			3.1	3.1	3.1
			3.4	3.5	3.4

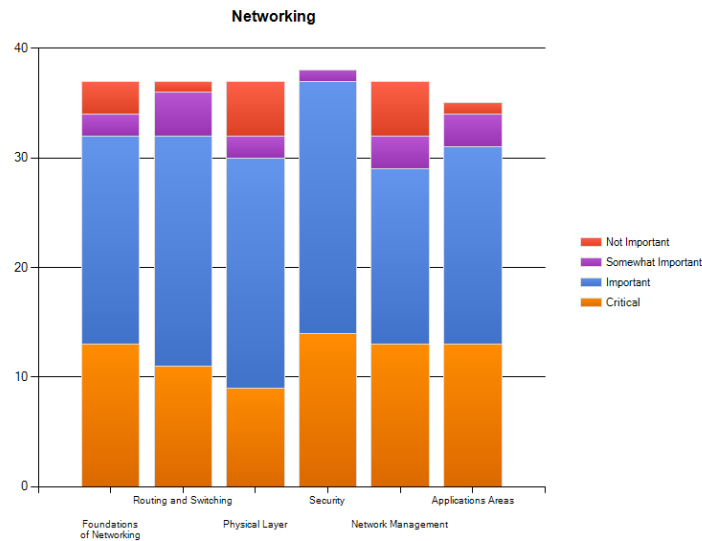
	Reno	Las Vegas	Combined
<b>Information Management</b>			
IM Concepts and Fundamentals	3.1	3.2	3.1
Database Query Languages	3.0	3.1	3.1
Data Organization Architecture	3.0	3.3	3.2
Data Modeling	3.1	3.0	3.0

	Reno	Las Vegas	Combined
<b>Integrative Programming and Technologies</b>			
Inter-Systems Communications	2.9	3.3	3.1
Data Mapping and Exchange	2.9	3.3	3.1
Scripting Techniques	2.9	3.2	3.1
Software Security Practices	3.0	3.4	3.2
Overview of Programming Languages	2.8	2.7	2.7
Miscellaneous Issues	2.4	2.4	2.4

	Reno	Las Vegas	Combined
<b>Math and Statistics for IT</b>			
Functions, Relations and Sets	3.2	3.0	3.1
Basic Logic	3.2	3.5	3.4
Applications of Math and Statistics to IT	3.0	3.2	3.1



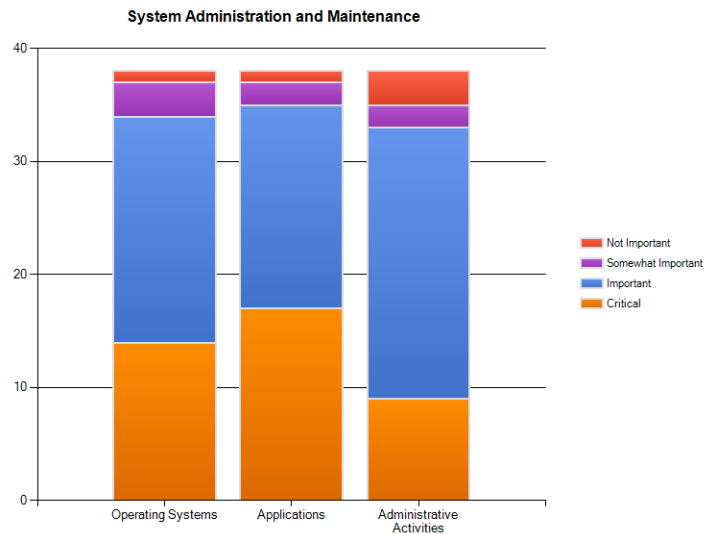
	Reno	Las Vegas	Combined
<b>Networking</b>			
Foundations of Networking	3.1	3.3	3.2
Routing and Switching	3.0	3.3	3.2
Physical Layer	2.9	3.1	3.0
Security	3.4	3.3	3.3
Network Management	2.9	3.2	3.1
Applications Areas	2.9	3.5	3.2



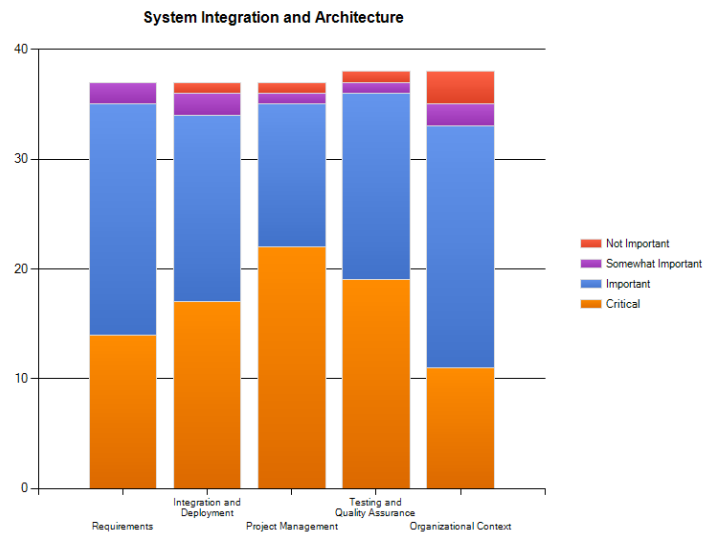
Rating Scale: 4 = Critical 3 = Important 2 = Somewhat Important 1 = Not important			
	Reno	Las Vegas	Combined
<b>Programming Fundamentals</b>			
Fundamental Data structures	3.3	2.9	3.1
Fundamental Programming Constructs	2.9	3.0	2.9
Objects-Oriented Programming	2.9	3.0	2.9
Algorithms and Problems Solving	3.2	3.1	3.1
Event-Driven Programming	2.8	3.0	2.9

	Reno	Las Vegas	Combined
<b>Platform Technologies</b>			
Operating Systems	3.1	3.1	3.1
Architecture and Organization	3.1	3.1	3.1
Computing Infrastructures	2.9	2.9	2.9

	Reno	Las Vegas	Combined
<b>System Administration and Maintenance</b>			
Operating systems	3.2	3.3	3.3
Applications	3.2	3.5	3.4
Administrative Activities	3.1	3.1	3.1



Rating Scale: 4 = Critical 3 = Important 2 = Somewhat Important 1 = Not important			
	Reno	Las Vegas	Combined
<b>System Integration and Architecture</b>			
Requirements	3.1	3.5	3.3
Integration and Deployment	3.3	3.5	3.4
Project Management	3.6	3.5	3.5
Testing and Quality Assurance	3.4	3.5	3.4
Organizational Context	3.2	3.1	3.2





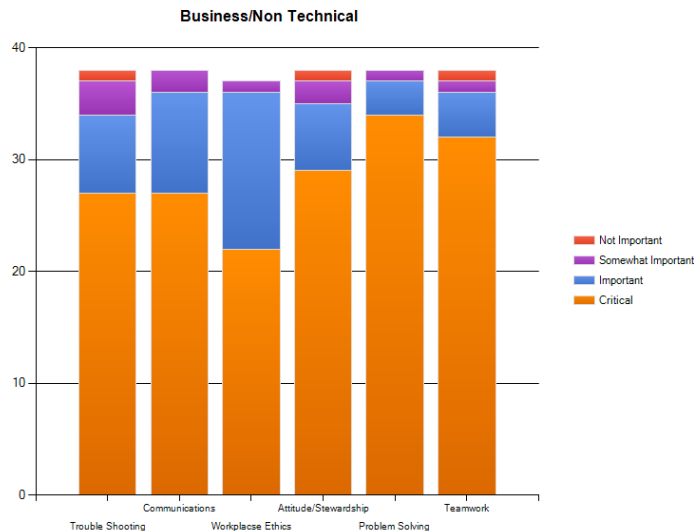
	Reno	Las Vegas	Combined
<b>Social and Professional Issues</b>			
Professional Communications	3.7	3.7	3.7
Teamwork Concepts and Issues	3.7	3.7	3.7
Social Context of Computing	3.1	3.0	3.0
Intellectual Property	2.9	3.0	3.0
Legal Issues in Computing	2.9	2.9	2.9
Organizational Context	3.0	3.0	3.0
Professional & Ethical Issues/Responsibilities	3.1	3.4	3.3
History of Computing	2.5	2.4	2.5
Privacy and Civil Liberties	2.8	3.0	2.9

	Reno	Las Vegas	Combined
<b>Web Systems and Technologies</b>			
Web Technologies	3.2	3.3	3.2
Information Architecture	3.2	3.2	3.2
Digital Media	2.8	3.3	3.1
Web Development	3.2	3.3	3.2
Vulnerabilities	3.4	3.3	3.3
Social Software	2.5	2.9	2.7

Rating Scale: 4 = Critical 3 = Important 2 = Somewhat Important 1 = Not important			
	Reno	Las Vegas	Combined
<b>Hardware</b>			
Analog Circuits and systems	n/a	3.0	3.0
Digital Circuits and Systems	n/a	3.3	3.3
Communications Theory	n/a	3.2	3.2
Data Acquisition	n/a	3.3	3.3
Transmission Lines (Fiber, Copper, Coax, UTP, STP, Etc..)	n/a	3.2	3.2

	Reno	Las Vegas	Combined
<b>Wireless</b>			
WAP Hardware	3.1	3.2	3.2
LAN/WAN Admin	3.0	3.1	3.1
Microwave/Radar	0.0	2.8	2.8
RF Principles	2.7	3.1	2.9
Wireless Client	3.0	3.2	3.1

	Reno	Las Vegas	Combined
<b>Business/Non-Technical</b>			
Trouble Shooting	3.6	3.6	3.6
Communications	3.6	3.7	3.7
Workplace Ethics	3.6	3.5	3.6
Attitude/Stewardship	3.6	3.7	3.7
Problem Solving	3.8	3.9	3.9
Teamwork	3.7	3.9	3.8



Participants were asked to list any important skills missing from the survey:

- |                               |                             |
|-------------------------------|-----------------------------|
| Linux Certifications          | Organizational processes    |
| PHP                           | Time-project management     |
| C#                            | English                     |
| C                             | Writing skills              |
| Demonstrated passion/interest | Critical thinking           |
| Innovation                    | Verbal communication        |
| Entrepreneurship              | Social media communications |
| IT Service Management         |                             |

For the most part there is congruence between the north and south focus groups. There was unanimous agreement regarding the Business/Non-Technical (soft) skills which aligns with workforce studies in other parts of the U.S.

These results are in substantial agreement with the results of the 2007 report. The primary differences between the two reports are reflective of the changes in technology over the past six years: Cloud computing, virtualization and mobility are much more in use by Nevada businesses in 2012.

## Follow-Up on 2007 Study

The recommendations in the 2007 report were summarized into four categories and questions developed for each to determine what actions have been taken by the Nevada community colleges with respect to the recommendations, and the impact of those actions.

Educators who attended the focus group met in small groups of 5 to 7 participants and reflected on actions and changes that took place in their colleges between 2007 and 2012. Four uniform questions were asked of each group and responses were collected on templates filled out by at least two note takers per group.

Below are the four questions asked of each team of educators:

Have you initiated case study instruction or are you using a collaborative, problem-based case-based structure for at least some courses?

1. If so, what was the process used to implement this? If not, what were the barriers?
2. What was the outcome?
3. What are the benefits, if any?

Are employers aware of and participate in the development and delivery of credit programs and courses as well as non-credit training and skill building for incumbent workers?

1. If so, what was the process used to implement this? If not, what were the barriers?
2. What was the outcome?
3. What are the benefits, if any?

Have you created high-level student learning outcomes for each course and developed outcomes-based equivalencies in which outcomes are established and agreed upon across the community college campuses?

1. If so, what was the process used to implement this? If not, what were the barriers?
2. What was the outcome?
3. What are the benefits, if any?

Have you made any efforts to address the problem of declining student enrollment?

1. If so, what did you do? If not, what were the barriers?
2. What was the outcome?
3. What are the benefits, if any?

There were more differences than similarities between the North and South focus groups in how they followed up on the 2007 report recommendations. In both regions, some progress was made in the implementation of problem-based/scenario-based learning and little progress was made in creating common high-level student learning outcomes across the community college campuses. Employers are involved in delivery of credit programs in both regions, with different challenges; however, many of the same issues remain the same as those noted in the 2007 report. Both regions have also engaged in activities to address declining student enrollment, with the Northern Region having a more comprehensive strategy, and with both regions reporting that the issue of declining student enrollment is not as prevalent as it was in 2007.

The colleges in Reno have implemented scenario-based learning (SBL) in several classes; specifically Project Management and interspersed in CISCO courses. The process to accomplish

this started with two trainings, one in Reno and one in Las Vegas. In general, instructors employed teams with little or no lecture, and just-in-time activities. Faculty reported their challenges, including the amount of work required to develop the SBL format and breaking the habit of the lecture mode. Some students also find this format challenging and need additional help in how to succeed in a SBL class. The primary benefit to students reported by Reno college faculty is they learn to enjoy solving problems.

The college in Las Vegas uses PBL/SBL less consistently. The focus of faculty discussion was on barriers which included:

- Vendor-created curriculum lacks flexibility,
- Case study takes more time at the expense of technical skills, and more than 2 years is needed if PBL is used.
- Faculty must account for the lecture/lab ratio, which is difficult with PBL
- Instructors cannot be told how to teach
- Must teach to a question bank geared toward outcomes based on standards.
- It is better to educate students about jobs available.
- Must qualify the businesses who come into the classroom; if they are running the groups, they must be qualified or students demotivate and interest drops off
- Students must be convinced that the PBL model works
- Students working and going to school do not treat classes as a learning environment with a means to an end
- How to develop a case study with a lab that can give dual credit, with the attendant lecture requirements
- If small groups are used, one person takes over
- Problems with tracking
- Problems with on-line education and PBL

Faculty did report that scenario-based learning is being used in graphic arts, winning a national award. In addition, troubleshooting is added to CCNA. In the programming class, group programming is used, and another instructor reported having the students form groups, and giving them the ability to fire a group member. Group peer observations and exit interviews are also used.

Benefits to students ere reported by one instructor saying that the students got real networking experience and soft skills and increased understanding of problem vs. success behaviors on the job.

With respect to employer awareness and participation in credit programs, Las Vegas faculty reported that JTSC (Joint Technical Skills Committee) committees are in place and providing feedback. In addition, there are internships that include interaction with industry, business input and evaluation of students. Reno faculty reported that Advisory Committees are used, and sometimes this produces good results. Some Advisory Committees are not producing, and individual employers are not approached. Results reported included:

- Obtaining ideas from the Advisory Committee on soft skills, which were used to drive a core of four classes in the AAS degree.
- People in industry developed material for computer science courses, with industry representative present at student end-of-course presentations, receiving excellent feedback for improvement. Credibility of the program increased, along with student buy-in.

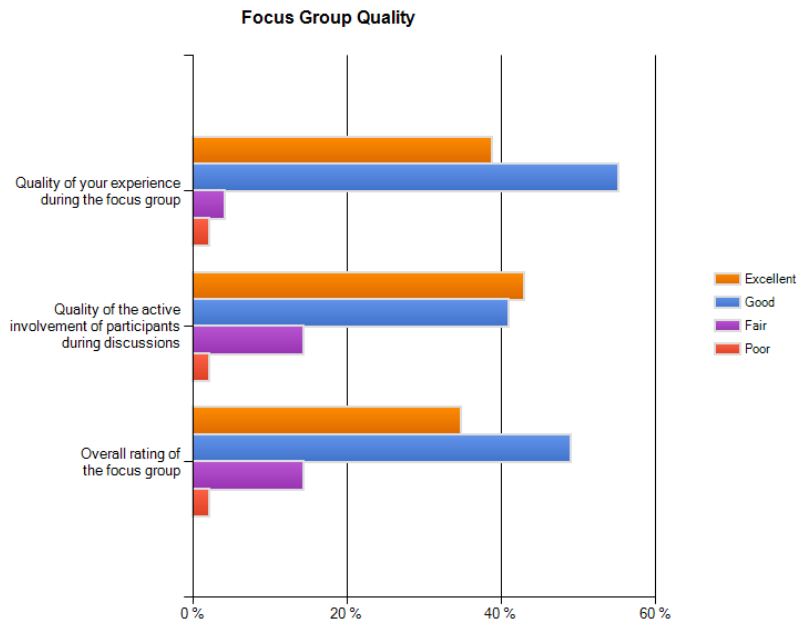
In both Reno and Las Vegas colleges, Student Learning Outcomes (SLO) and assessments have been created for all courses, but they have not been agreed upon across community college campuses. The benefits for SLOs in individual courses are clear to faculty, but they have not taken the next step to develop them across their own campuses or among community college campuses in Nevada.

Declining student enrollment was characterized by both focus groups as true in the aggregate, but not the case in specific subsets of ICT. Colleges acknowledged the need to adapt to changes in student interest and market demand. Las Vegas has engaged in promotional posters/advertising and promotion of classes within existing courses. Las Vegas faculty also stressed that companies in their city need to do more to connect with CSN and increase their involvement and high schools need to make it known that jobs are available in ICT. Reno faculty reported that they have increased the current information they have in classes and have found this to be a critical factor. They have also changed the scheduling of classes to times more convenient to students, including night classes. Reno colleges have adopted different formats including on-ground, online and hybrid to meet student needs. Finally, outreach to high schools has increased, particularly in virtual classes, graphic design and programming logic courses.

### Focus Group Evaluation

Surveys were sent to educator and industry participants to obtain their feedback. The survey for the Las Vegas group was sent out three weeks following the focus group and six weeks following the Reno group. The delay in sending the survey to the Reno group may have some impact on the quality and quantity of the feedback. The response rate for the surveys was higher in Las Vegas (86%) than Reno (63%), as might be expected.

Feedback on the focus groups was positive in both regions, with 94% of participants rating the quality of their experience during the focus group as excellent or good.



Feedback from participants indicated that they would like more information prior to the focus group and a better understanding of its purpose. One interpretation of this rating is that both educators and industry participants were sent and responded to the evaluation survey. During the focus group, industry participants had few questions about the process and seemed well-prepared for it. In general, educators had questions about the process at their tables in which they reflected on actions taken and impact on students based on recommendations from the 2007 report. This contingent of the focus group may have impacted the overall ratings.

Following are highlights of the survey responses.

- 90% of participants agreed that the length of the focus group was about right
- 68% thought that the optimal length of time for a focus group, like the ones conducted in May 2012, is 1.5 to 2 hours in length. However, 21% thought the optimal length of time is 2.5 to 3.5 hours.
- 96% thought the topics covered were appropriate
- 92% thought their time was used effectively
- 75% said the information provided prior to the focus group was clear. This breaks down by region to 68% in Reno and 56% in Las Vegas saying it was clear.
- 79% indicated they understood the purpose of the focus group, with 83% in Reno and 78% in Las Vegas understanding the purpose of the focus group.
- 98% said they learned something while at the focus group.
- 94% thought the focus group asked useful questions.

## Outcomes and Conclusions

### Study Objectives

**Objective 1:** Bring together industry and education to discuss community college education from the perspective of employers.

The industry participants in the focus groups were engaged in the discussion from the beginning and demonstrated their commitment to the community colleges. In general, the companies represented do hire community college graduates and the participants had feedback for the colleges on strengths and weaknesses of those graduates.

Focus groups also requested that the colleges follow up on ICT certifications and portable credentials, particularly in project management and services management. Further development of internship programs, with more information on procedures to implement them would be welcomed by industry partners.

The occupational opportunities identified by the focus groups are consistent, suggesting high levels of opportunity for potential graduates of the community colleges.

**Objective 2:** Describe the current and projected high-demand jobs in the information technology sector in Nevada.

Themes in high-demand jobs included mobility, cloud, big data and convergence of technologies. The state is still in recovery from the Great Recession of 2008, but there are indications of some growth, particularly with military contractors. Participants advised strongly that the jobs of the future for ICT technicians will be more multi-dimensional, and will require skill sets that are both broad and specialized.

**Objective 3:** Describe the job and competencies required for eligible workers to fill current and projected employment opportunities in the information technology sector in Nevada.

Participants completed an extensive skills survey to rank the importance of 84 ICT knowledge and skills. There was consistent congruence in ratings from the two focus groups. Variations within the topic areas will provide information for faculty and staff to prioritize topics and modules within programs and courses.

Most knowledge and skills were ranked as important, with the exception of the Business/Non Technical knowledge and skills, or soft skills such as attitude, problem solving, communications, ethics and teamwork.

The soft skills were the only competencies ranked as critical in the participant survey, with all other competencies ranked as important or less. This finding was also a featured conclusion in the 2007 report. Given that this finding has been the case for over five years, there is a strong indicator for the college sponsors of this study to follow up on how to include soft skills in ICT technical courses and programs.

**Objective 4:** Update the study conducted in 2007.

Faculty in attendance worked in teams to reflect on four high level-recommendations from the 2007 report and the actions that have been taken with respect to those recommendations. Three of the four recommendations have had at least some action taken, with positive impact on the system and students: 1) further implementation of problem-based/case-based learning; 2) further involvement of businesses in for-credit program design; 3) efforts to address declining enrollment.. The one recommendation not undertaken is to create high-level student learning outcomes for each course and develop outcomes-based equivalencies that are established and agreed upon across the community college campuses.

The knowledge and skills rankings were generally consistent with those from the 2007 study with nuanced differences within topic areas.

## **Conclusion**

While the focus group outcomes suggest a number of potential initiatives, it will be up to the community colleges to determine which activities will be most beneficial to their growing number of industry partners and their students, and most feasible for it to leverage its resources. Existing relationships were strengthened by the focus groups, and new relationships were developed. As the colleges explore potential models for their ICT courses and programs, they have a strong base from which to draw expertise and resources.

APPENDIX 1: FOCUS GROUP QUESTIONS



## FOCUS GROUP QUESTIONS

### INDUSTRY GROUPS: HIGH DEMAND JOBS

- What have been the major changes in the NV business / economic environment since 2006
- What does this mean for the future of technology-based or technology-enabled enterprises going forward
- What are your current near-term growth and hiring expectations (clerical, professional, technical, other)

### INDUSTRY GROUPS: CAREER PATHWAYS

Remembering that the focus is entry level for middle skill workers...

- Do you currently consider CC graduates when filling openings
- What shortcomings do you perceive CC students have compared to other applicants
- What benefits to CC students bring relative to other applicants

### EDUCATION GROUPS: FOLLOW UP ON 2007 STUDY #1

Since the last study, conducted in 2007:

- Have you initiated case study instruction or are you using a collaborative, problem-based case-based structure for at least some courses?
  - If so, what was the process used to implement this? If not, what were the barriers?
  - What was the outcome?
  - What are the benefits, if any?
- Are employers aware of and participate in the development and delivery of credit programs and courses as well as non-credit training and skill building for incumbent workers?
  - If so, what was the process used to implement this? If not, what were the barriers?
  - What was the outcome?
  - What are the benefits, if any?

### EDUCATION GROUPS: FOLLOW UP ON 2007 STUDY #2

Since the last study, conducted in 2007:

- Have you created high-level student learning outcomes for each course and developed outcomes-based equivalencies in which outcomes are established and agreed upon across the community college campuses?
  - If so, what was the process used to implement this? If not, what were the barriers?
  - What was the outcome?
  - What are the benefits, if any?
- Have you made any efforts to address the problem of declining student enrollment?
  - If so, what did you do? If not, what were the barriers?
  - What was the outcome?
  - What are the benefits, if any?

## **LARGE GROUP DISCUSSION**

Some employers suggest a bachelors degree as an entry level qualification for the vast majority of ICT jobs. Other employers are looking for they want entry level technicians pursuing the associates Degrees.

However at times, short term training is called for, that results in a certificate as opposed to a degree.

- Are there other credentials that employers in our area would consider, such as vendor certification or specific courses, and which ones are most useful.
- Are there specific skills sets that offer the opportunity for entry level employment without a bachelors degree? Specifically, what can the college provide that would qualify someone for employment beside a Bachelors degree?