

ICT Educator Webinar Series

The Rising Demand for IT Skills in Non-Tech Industries

December 6, 2019

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Welcome

STEVE WRIGHT: Good morning, everybody. Welcome to the ICT Educator Webinar Series. I'm Steve Wright. I'm the Statewide Director for the California Community College ICT sector team. You can visit our website and see all of our amazing ten Regional Directors and our support team, which includes Nicole Sherman, who is the producer of this weekly series.

We provide this series as an alternative to conferences, where you would all have to travel. Lucky for us, because Will Markow today comes from Boston—that's where he is right now, although he would probably enjoy coming to Southern California—the way we get this kind of talent and interesting people is using the technology that's available. It's terrific!

Posted Webinars

IT/CYBERSECURITY

- Cloudification of the IT Model Curriculum
- Completing a 4-Year Degree in Cybersecurity through the CCCs

BUSINESS APPLICATIONS

- BIW Dual Enrollment at Cerro Coso College
- BIW Cross-Disciplinary Certificates at College of the Desert

VIRTUAL LABS

- NETLAB+ Updates & Cybersecurity Summer Camps & Competitions
- Practice Labs in the South Central Coast Region

ICT GENERAL

- Exploring the ICT Disciplines: Helping Students Decide Which ICT Career is for Them
- Boosting Hispanic Student Success in ICT

DIGITAL MEDIA/ENTERTAINMENT

- Skills in Demand for Creative/Digital Professionals

STEVE WRIGHT: So, anyhow, we have over the past year had the good fortune to offer a number of webinars. Here are just a few of the top-ranking ones in terms of attention both before and after. We find that we have almost an equal number of people view these after they're recorded as at the time, so we've had over 1,040 views of our webinars this year, and we think that's pretty terrific. So, I encourage you, since this is the last one of this particular calendar year (we'll have a whole new agenda for January and the rest of the year next year coming out), it's a good time to go back and look at some of these. These were very well received.

Webinar Presenter



STEVE WRIGHT: Today, however, we're very fortunate to have Will Markow from Burning Glass come to us and talk about an interesting topic, which is 'where are those IT jobs?' I think a secondary type topic lead in his research report said that 90% of IT jobs are in non-tech businesses. It just stood out like neon to me because we're obviously interested in, well, what businesses are they, what are they doing, and what else do they need to know? Without any further chatter from me, I'd like to turn it over to Will, so he can tell us how that report happened and what we need to know.

[00:02:13]

Beyond Tech: The Rising Demand for IT Skills in Non-Tech Industries

WILL MARKOW: Great. Thank you so much, Steve. It's great to be here. Even though I am stuck in snowy Boston rather than sunny California, I am very excited to share with everybody some of the research that we've done looking at the demand for IT jobs and skills across the broader market.

Just to give you some context on the role that I play at Burning Glass, I oversee our emerging technologies research team, and one of the key questions that we consistently ask is how are emerging technologies impacting and disrupting the workforce?

What Most People Think IT Workers Do...



WILL MARKOW: And it probably comes as little surprise to many people that IT-related jobs and skills, and digital skills more generally, are often some of the roles that have the most widespread disruptive impact across the market, but we see that there is still a fair amount of misperception

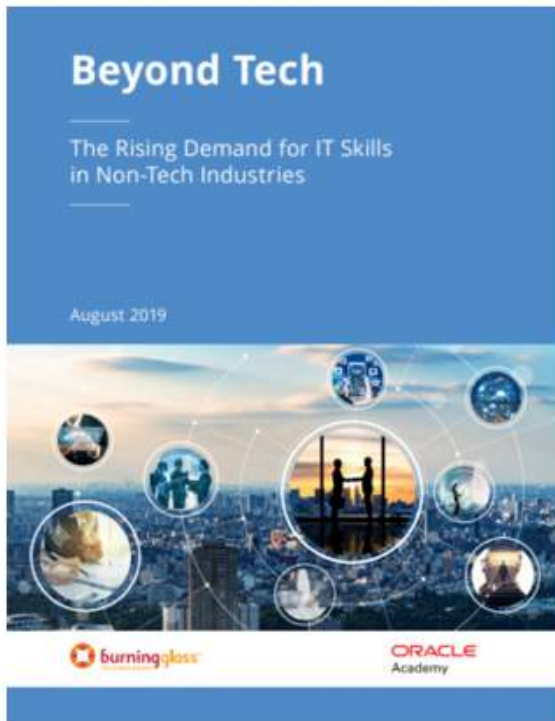
around how IT jobs are actually manifesting across the economy, the standard stereotypes that many people have in their head is of a Software Developer, probably wearing a hoodie, working for a Silicon Valley startup, typing away on a computer, building the next Facebook.

...What IT Workers Really Do



WILL MARKOW: But the reality is that IT jobs are very diverse. There are many different types of roles across the IT ecosystem that go far beyond just the stereotypical Software Developer to Cybersecurity Engineers to Network Specialists to System Administrators and Computer Network Specialists and dozens of other roles that make up the larger ecosystem of IT workers, so being able to clearly articulate the true range of opportunities within IT to students and other individuals is going to be of paramount importance as we try to build more opportunities for people in this field.

Closing the IT Perception Gap



- Burning Glass and Oracle Academy partnered to research demand for IT jobs and skills in non-tech industries
- This is the third in a series of reports that Burning Glass and Oracle Academy have released to illuminate the true demand for IT skills across the economy

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WILL MARKOW: So, we recognize that there was this perception gap about what actually constitutes the IT workforce and where those jobs exist. Burning Glass partnered with Oracle Academy to release a report on the demand on IT jobs and skills outside of the traditional tech industries so that we could highlight some of the opportunities for IT jobs outside of the stereotypical Facebooks and Googles of the world.

This was the third report in a series that Burning Glass and Oracle Academy have released looking at the true demand for IT jobs and skills across the economy so that students, educators, and other stakeholders can have a clear understanding of where there are opportunities to leverage IT jobs and skills across the workforce.

We wanted this research to paint as comprehensive a picture as possible of the IT workforce and the opportunities for people who have IT skills, but if we wanted to paint that

comprehensive picture, we also needed comprehensive data on the IT workforce. So, we wanted to move beyond the data that you can get from traditional government statistics, such as the Bureau of Labor statistics, because they often don't provide the level of granularity, especially at an industry level, necessary for us to truly understand where IT jobs and skills are becoming most prevalent.

Burning Glass bridges Data science and practical application



Burning Glass data have been built over 15 years with robust taxonomies and the industry's largest in-house data science team.



WILL MARKOW: So, to try to move beyond the traditional limitations of labor market data, we turned to some proprietary datasets that Burning Glass has been compiling for about the past 10 years, which are made up of hundreds of millions of online job postings that we spider from about 40,000 to 50,000 unique job boards every day, as well as a few hundred million resumes and worker profiles that can give us insight into the career pathways of people who moved into the IT workforce.

Key innovations

Make job data comprehensive & actionable



REAL-TIME DATA COLLECTION

We are driving a shift in labor market research from macroeconomic survey to comprehensive job posting collection



COMMON LANGUAGE

Our taxonomies allow us to aggregate job market signals across an array of dimensions and identify key trends



PREDICTIVE ANALYTICS

We deliver a range of modeled insights, including accurate future projections and career and learning recommendation.



MATCHING AT SCALE

Robust market intel enables a shift from affecting individual labor market transactions to strategic investment & redeployment

WILL MARKOW: To wring insight out of these data, what Burning Glass does is we take all of these datasets, and then we run them through our artificial intelligence engines that can extract key information about each job or worker history, such as...

- What is the job title?
- What occupation does it map to?
- What are the key skillsets or certifications or other requirements that are being requested?
- As well as dozens of other variables that help us build analytics on top of these datasets to provide useful and actionable insights about the workforce and IT jobs, specifically

Isolating the Universe of IT Jobs

1

Identify over 1,900 skills and close to 170 occupations related to IT

2

Mine Burning Glass's database of more than 150 million unique online job openings to identify jobs requesting IT skills or occupations

3

Classify jobs into tech or non-tech sectors based upon NAICS industry codes (informed by CompTIA's definition of tech industry)

[00:06:57]

WILL MARKOW: Leveraging these datasets, we first wanted to build a definition of the IT workforce that was as comprehensive as possible and that enabled us to answer some of the key questions we set out to answer around where there are opportunities for people with IT skillsets to work outside of the traditional tech industry.

The first step in this process was identifying the key jobs and skills that make up the IT workforce. We identified over 1,900 skills as well as about 170 occupations which were all related to IT in some capacity, which ranged from computer support specialists to software developers, as well as skills that are, in some cases, higher level development skills and, in some cases, were specific technologies that leveraged or required some strong digital competencies, such as particular software packages.

Once we identified this universe of jobs and skills, we pinpointed jobs within Burning Glass's database of job postings so that we could find out where these jobs and skills are being demanded.

And then, as a final step, we sliced it by different industry codes so that we could segment out the jobs in IT that were within the traditional tech industry, as well as those that were in other industries not commonly associated with the Facebooks or Googles of the world.

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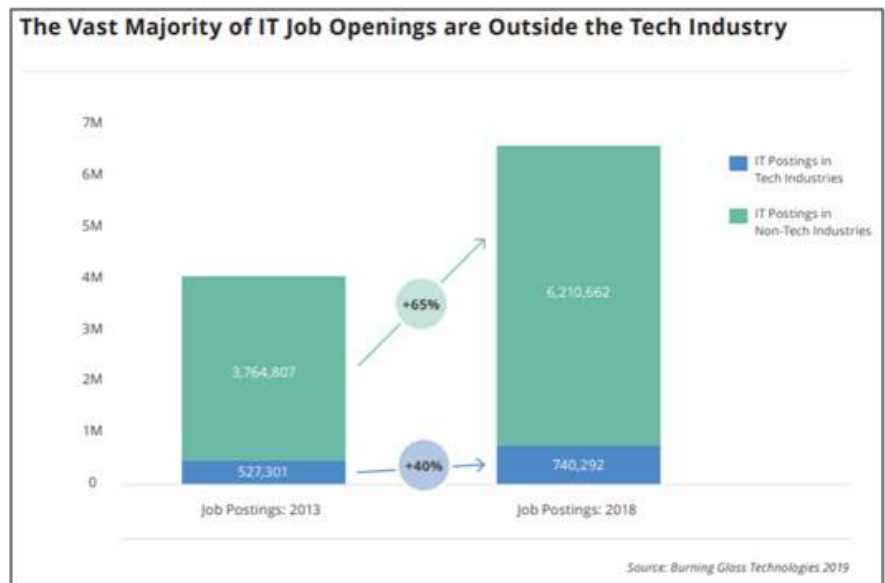
What Did We Learn?

WILL MARKOW: So, once we had built this definition, what were some of the key insights that we wrung out of the analysis?

IT Jobs are Large and Growing Especially Outside of the Tech Industry



- In 2018 there were over 6.9m IT job openings
- The majority of IT job openings – 89 percent – were in non-tech industries
- From 2013-2018, IT jobs outside of tech grew over 60% faster than in tech



WILL MARKOW: The first thing we saw is that IT jobs are large, and they're growing rapidly. In 2018, there were close to 7 million IT job openings overall in the United States, and perhaps the most startling finding (which Steve already mentioned) was that about 90% of IT jobs openings were outside of what we consider the traditional tech industry.

So, it's not simply the case that there are some job opportunities in IT outside of tech, but the reality is the vast majority of IT job opportunities are outside of tech, so we need to be able to communicate that to students or job seekers who are trying to determine where they could start

their careers in IT. If they are still clinging to the stereotype of ‘I have to go work in Silicon Valley and become a coder or a developer,’ then that is probably not going to lead to many job opportunities, so we need to disabuse students of that notion.

We’ve also seen that, over the past five years, the IT job demand outside of tech grew considerably faster than demand in tech—in fact, it grew about 60% faster than demand grew within the tech industry, which makes sense, given that the tech industry has long ago adopted many of these digital technologies and IT work roles, whereas many other industries are still a bit behind the tech industry in adoption of some of these, so there’s going to be more room to grow their IT workforce and further their digital transformation efforts, and that creates new opportunities for workers who are looking to enter into IT-related roles in those industries.

Across Roles, Non-Tech IT Opportunities Dwarf Those in Tech

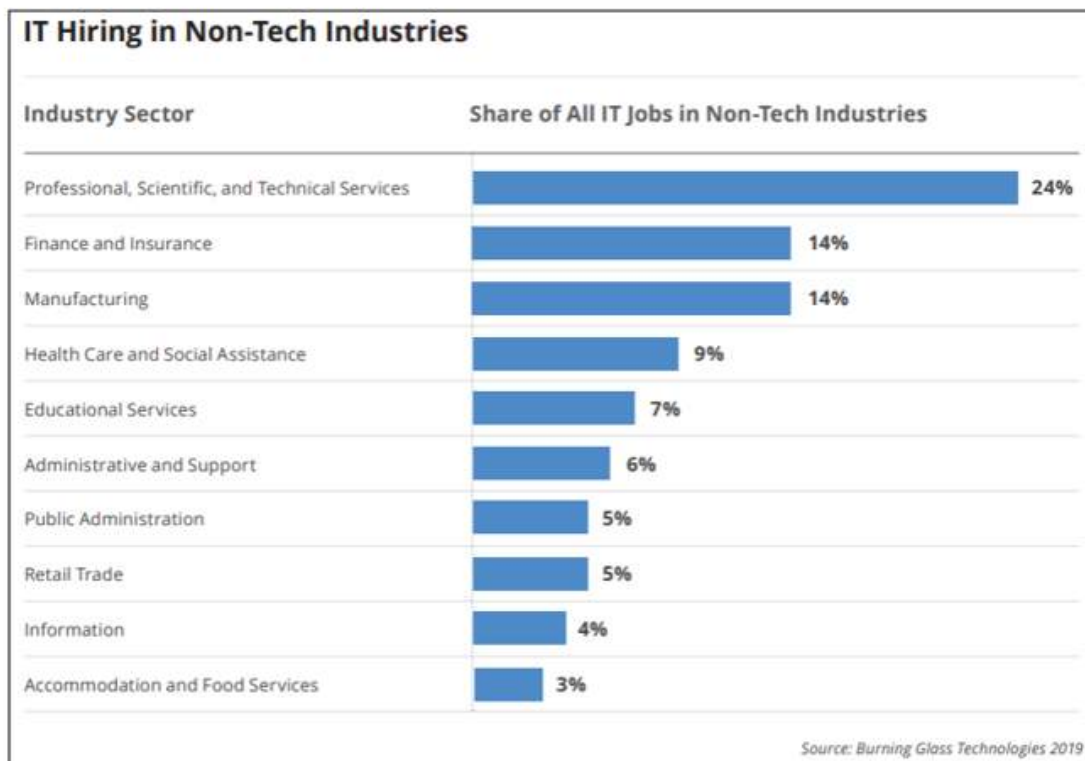


Occupation	IT Postings	Share of IT Postings in Tech Industries	Share of IT Postings in Non-Tech Industries
Development			
Software Developer / Engineer	315,824	10%	90%
Application Developer / Engineer	80,150	9%	91%
Networking and Systems			
Network Engineer / Architect	112,122	12%	88%
Systems Engineer	107,221	15%	85%
Computer Support			
Computer Support Specialist	71,462	5%	95%
Help Desk Technician / Analyst	48,628	5%	95%

Source: Burning Glass Technologies 2019

WILL MARKOW: And just to underscore the breadth of opportunity in IT outside of tech, we wanted to isolate the specific types of jobs that were being called for both in tech and in non-tech, and one of the things we found was that there really isn't a set of IT jobs that are unique to the tech industry. In fact, the vast majority of IT jobs have at least 90% of demand outside of the traditional tech industry, and that's even true for Software Developers, who are often most associated with the Facebooks of the world. It's also true for networking jobs as well as computer support jobs, so this really underscores that, no matter where somebody is looking to go within the IT space, they are still going to have the vast majority of opportunity if they look beyond the traditional tech sector and into some of those other sectors that traditionally may not have been associated with tech.

All Industries are Tech-Adjacent IT Jobs Are Demanded Across all Industries



WILL MARKOW: Something else we found is that, increasingly, it's hard to disassociate any sector with the tech industry. We found that IT-related jobs and skills are very much prevalent in a broad

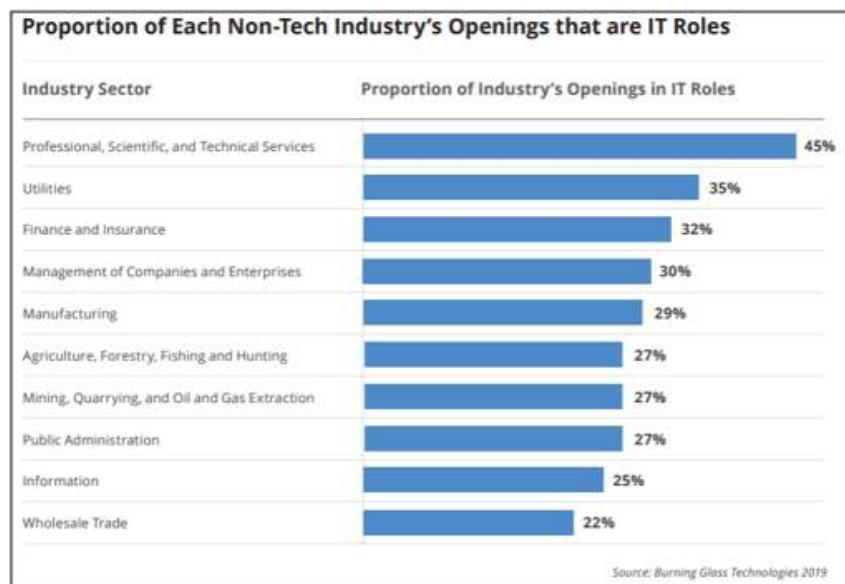
range of industries, and there really aren't any industries yet that are not showing some measure of demand for IT-related jobs and skills. You really can't get around the need to digitally transform your business, and to do that, you need IT workers.

We found there is robust demand for IT workers in fields such as finance and insurance, manufacturing, retail, public administration, education—all of these industries now are requiring a large set of IT workers and have a nontrivial impact on the broader market for IT expertise.

All Industries are IT-Enabled But IT Jobs Leave a Bigger Footprint in Some Industries Than Others



- IT jobs are critical across industries
- Nearly half of all job openings in professional services are IT jobs
- IT jobs account for over 30% of all job openings in Utilities and Finance & Insurance



WILL MARKOW: And looking at it another way, we also see that, within basically every industry, a very large share of their workforce is dedicated to IT-related functions. Sectors such as finance or utilities or manufacturing have at least 30% of their workforce now dedicated to IT-related jobs and skills. This is also true for fields such as mining and oil and gas extraction, public administration... No matter where you go, you're seeing a heavy concentration of these jobs, so every industry is being impacted by the need to enhance their digital capabilities, so there is very strong opportunity for students to look within some of these industries that they might not have

initially thought of when thinking of starting a career in tech. I'm not sure how many people realize how many opportunities there are for IT jobs in oil and gas, for example, or manufacturing, but increasingly, those industries are reliant on digital technologies and need digital workers to help develop and implement them.

Not All IT Jobs Are Created Equal Skill Requirements Differ Across Industries



- Some IT skills are important across industries – such as SQL – while some skills are more prevalent in specific industries, such as data analysis in Finance or ERP software in Manufacturing
- This underscores the need for IT workers to understand the skill needs of each industry and build the adaptability to combine new sets of skills

Tech Sector	Non-tech Sector: Finance	Non-tech Sector: Manufacturing Industry
1. Software Development	1. SQL	1. ERP Software
2. SQL	2. Data Analysis	2. Technical Support
3. Java	3. Java	3. Data Analysis
4. Python	4. Software Development	4. Software Development
5. Linux	5. Python	5. SQL

Source: Burning Glass Technologies 2019

WILL MARKOW: It's also the case that not all IT jobs are created equal across these industries. Every sector is going to have a unique set of skillsets that IT workers are going to need to develop, and one of the things that we set out to do in this research was help to pinpoint some of the unique competencies that are required across different sectors.

There are certainly some skillsets that are broadly required across a large range of sectors. SQL and software development are very commonly requested, regardless of sector, but there are certain other skills that bubble up to the top of the list in terms of most demanded skillsets in different industries.

In finance, for example, we see much greater emphasis on skills related to data analysis or SQL, which is related to database administration, which makes sense since in finance they have huge amounts of financial data that they need to be able to process and store, so they need IT workers to help them do that.

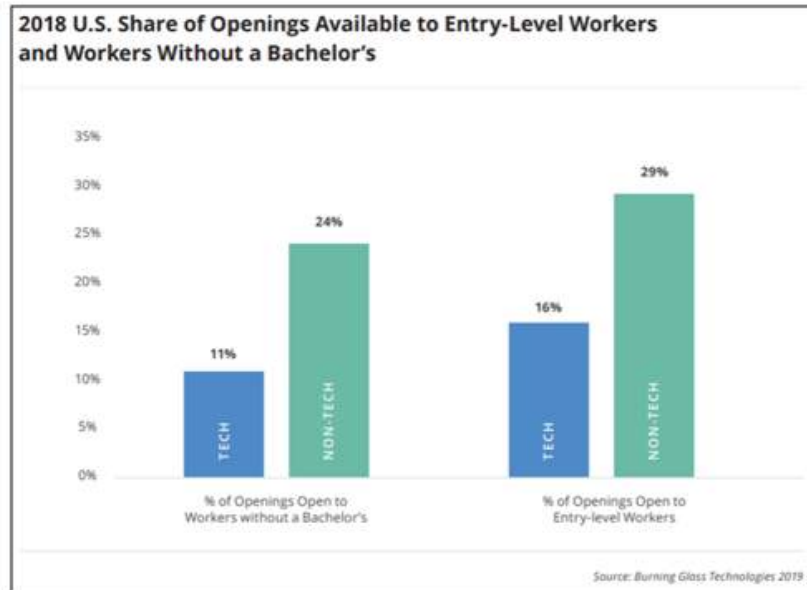
Similarly, in the manufacturing industry, we see very strong demand for IT workers with experience in ERP software. This is one that jumped out to us as a particularly interesting finding because it also underscores two sides of the IT coin in the sense that, in order to incorporate the ERP software in the manufacturing industry you, on the one hand, need IT workers who are helping to build and deploy the ERP software tools, but then you also need an entire workforce that is literate enough in ERP software to be able to leverage those tools internally. So, that creates a whole new set of tech-adjacent workers who need to increasingly incorporate IT-related skillsets into their portfolio, and that also underscores the need for even workers who may not be following a traditional IT-related path to develop new digital skills and computer science skills and IT-related skills so that they can increasingly function in an ever more digital economy.

IT Jobs Outside of Tech Help Workers Gain a Foothold

Non-Tech IT Jobs Are More Accessible



- IT jobs outside of tech are less likely to request a bachelor's degree or previous work experience
- This makes non-tech IT jobs more accessible for entry-level workers or workers without a bachelor's degree



WILL MARKOW: Another one of the more striking findings that we found in our research was that non-tech industries often offer some of the strongest entry-level opportunities for IT workers. In fact, the tech industry has become much less accessible for IT workers, even though there was long the stereotype that “oh, you just need to be good coder, it’s a meritocracy, and if you know what you're doing, you can go and get a job at a startup or a Google.”

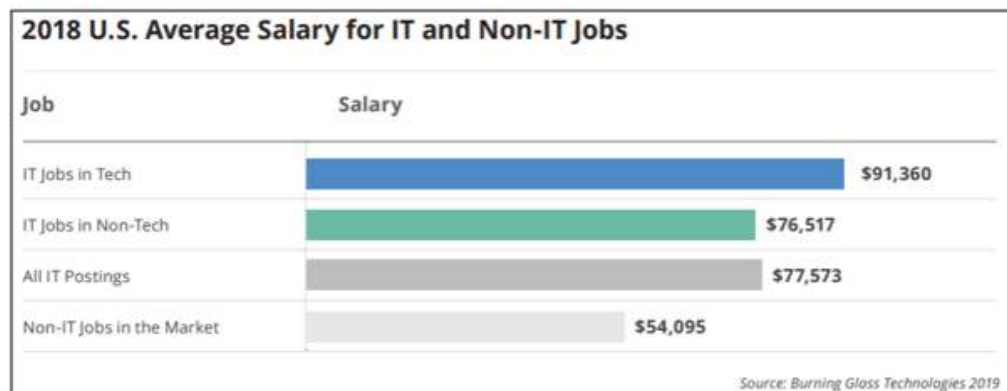
What the data say is that that is increasingly not the case and that there are actually many more opportunities for somebody who doesn't have a bachelor's degree or somebody who doesn't have a significant amount of previous work experience outside of the tech industry. We see that far higher shares of IT openings in the non-tech sectors are accessible to workers without a traditional four-year degree plus at least three to five years of previous work experience. This suggests that if a worker, especially one without a bachelor's degree, is looking to gain a foothold in the IT space, they are probably going to have a much easier time if they look outside of the traditional tech industry and consider some of those other industries, such as finance or

manufacturing or retail, where IT jobs are still in strong demand but may not have such heightened experience and education requirements.

IT Jobs Are Highly Lucrative Across Sectors



- Across tech and non-tech sectors, IT jobs pay impressive salaries
- However, the tech industry pays a premium, offering IT salaries close to \$15,000 above those in non-tech
- Nonetheless, IT jobs both in and out of tech pay substantially more than non-IT jobs, on the order of \$20,000 and up



WILL MARKOW: We also wanted to be able to communicate the return on investment for students who are entering into IT-related careers. We wanted to be able to quantify the value of gaining IT-related skillsets.

What we found is that the salaries for IT jobs, unsurprisingly, are considerably higher than non-IT jobs both in tech and outside of tech. Now, it is true that we saw higher salaries in the tech industry, which may indeed be a function of the heightened experience and education requirements that they were calling for, but we still see that even IT jobs outside of the tech industry are offering salaries that are over \$20,000 more than jobs that are outside of the IT function. So, being able to communicate to students the increased salaries that they can command by learning IT-related skills and focusing on IT-related careers can be a powerful way to help bring

more individuals into the field who otherwise may not have been certain on whether an IT career was right for them.

Developing IT Skills Provides Enduring Value



- Over the course of one's career, the estimated lifetime earnings of IT workers greatly exceed those of non-IT workers, regardless of industry.
- On average, IT workers can make 19% more than non-IT workers – or \$802,129 over the course of a career.



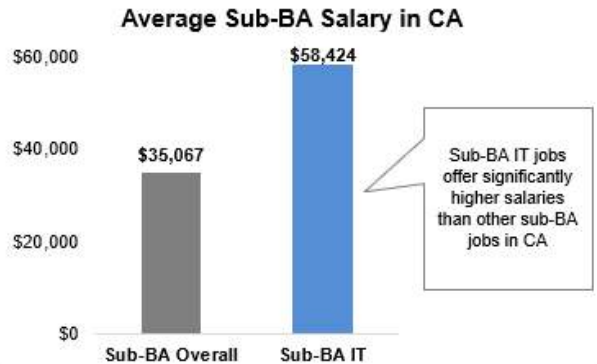
WILL MARKOW: And just to underscore the point that IT jobs are highly lucrative, especially relative to other opportunities in the workforce, we wanted to quantify the salary that somebody can expect or the career lifetime earnings that someone can expect over the duration of a normal working life. When we looked at this, we found that, on average, IT workers can make about 19% more than non-IT workers, which, over the course of a career, translates to over \$800,000. And when you compare that to minimum wage jobs or even just some of the other jobs that are out there, the gap becomes even more stark.

So, being able to communicate, again, to individuals how strong of an ROI you can get by directing your education in a computer science or IT-related direction can be a powerful motivator to help more people understand the value associated with developing skills in IT.

All Jobs Are Local: IT Jobs in CA



From 12/2018 through 11/2019, there were **636,201** IT job openings in California



Top Non-Tech Industries for IT Jobs in CA

Industry	Greater concentration in CA than the nation overall
Insurance Carriers	
Aerospace Manufacturing	↑
Architectural Services	
Banks	
Higher Education	
Hospitals	
National Security	
Pharmaceutical Manufacturing	↑
Physician Offices	↑
Legislative and Government Support	

↑ Greater concentration in CA than the nation overall

Top IT Occupations in CA

Job Title
Software Developer
Computer Systems Engineer
Computer Support Specialist
IT Project Manager
Web Developer
Network Engineer
Software QA Engineer / Tester
Systems Analyst
Cybersecurity Engineer
Database Administrator

Bolded jobs have at least 1,000 job openings for sub-BA workers

WILL MARKOW: Now, the report that we released with Oracle was national in focus, and it's certainly useful to be able to look at national trends and then apply them to the work that you are doing preparing the next generation of IT workers, but really we often find that the most actionable insights come when you start to look at the local level and understand what the IT hiring landscape looks like in your region. So, we pulled together a few statistics on the California market specifically on the IT workforce to get a sense for what some of the strongest opportunities may look like within California.

What we found is that, over the past 12 months, there were over 600,000 openings in IT jobs in California, which far and away makes California the largest market for IT jobs in the country, but we also found that this demand is certainly not just concentrated in Silicon Valley—it's broken out across a broad range of industries even in California, which has the stereotype of being the epicenter for the tech industry. There is still very strong demand for IT jobs in California in

industries such as aerospace, insurance, banks, healthcare, pharmaceutical manufacturing, and many other sectors where many people may not typically associate IT job opportunities with some of those sectors, but the reality is that the vast majority of opportunities—even in California, where you do have the strongest tech economy at least in the country, if not the world—there are still job opportunities in many other sectors, and it's going to benefit students by helping to direct them to those opportunities.

We also found that the job opportunities in California are also not concentrated in just Software Developers or certain types of roles. It breaks out across a diverse set of IT jobs ranging from IT Developers to Computer Support Specialists and Cybersecurity Engineers, Database Administrators. All of these roles are still in very strong demand in California, and even at the sub-BA level, they offer very strong salaries relative to other opportunities. In California, the average sub-BA salary for IT jobs was close to \$60,000, which is over \$23,000 more than the average salary for other sub-BA jobs. So, if we're preparing workers who don't have a bachelor's degree for jobs in IT, being able to demonstrate the value of those careers and highlighting that IT jobs are some of, if not the, best paying job opportunities for someone without a bachelor's degree can be a powerful motivator to getting more people to enter into the field.

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What Can Educators Do?

WILL MARKOW: So, those are many of the key findings from our report, but we also wanted to distill some of these findings into a set of recommendations and implications for educators as well as other stakeholders so that they can understand how to help communicate the findings to different students and different populations of individuals who might be considering a career in IT, as well as to work more effectively at building the next generation of IT workers who are knowledgeable of the true range of opportunities in the field and can target some of these strong opportunities outside of the traditional tech sector.

Spread the Word to Entry-Level Workers **Promote Non-Tech IT Jobs for their Accessibility**



- IT jobs outside of tech are more accessible, especially for workers without a bachelor's degree or significant work experience
- This makes them strong targets for entry-level workers
- Communicating opportunities outside of tech to these workers can increase their post-employment opportunities

WILL MARKOW: And the first recommendation we have is to help spread the word, especially to entry-level workers who are just starting out on their careers and trying to figure out how to gain a foothold in the IT space. Non-tech IT jobs, especially, are more accessible to workers without a

bachelor's degree or who are just starting their careers, so being able to communicate how strong some of these opportunities outside of the traditional tech industry may be for these entry-level workers is going to help them to gain a foothold in the space and help them to recognize the strongest path forward as they try to embark upon a career in IT.

Break Down Silos Embed IT Skills Within Curricula Across Departments



- IT jobs require a diverse mix of skills across industries
- Preparing students for these jobs requires coordinated teaching across disciplines
- Teachers may embed IT skills within curricula regardless of department

WILL MARKOW: We also found that being able to break down some of the traditional silos within the IT training space can be an important step to helping prepare people for jobs in a diverse set of industries calling for IT workers. As we saw earlier, IT jobs are not monolithic. They require a diverse set of different skillsets across different jobs and across different industries, and occasionally, that means pairing skills from computer science as well as other disciplines in novel ways. So, being able to embed IT skills within curricula across departments and being able to take an interdisciplinary approach to preparing workers for jobs in the IT space can be a powerful way of helping more people gain the skills necessary for the diverse set of opportunities across industries.

This also aligns with much of the research that Burning Glass has done looking at a phenomenon that we call **workforce hybridization**, or the fusing of different skillsets from

disparate domains both in IT but across the market more broadly. We see Marketing Managers who need to have SQL, UI/UX designers who have to combine development skills with graphic design skills, and many other types of roles that are becoming hybrids of two traditional fields, which historically had been thought of as separate. So, being able to take an interdisciplinary approach, not just for IT but for training in general, is becoming increasingly important as the traditional barriers between fields and the traditional silos are being broken down in the eyes of employers, so educators will need to follow suit in order to prepare their workers for the jobs of the future.

Battle Misperceptions Communicate the True Range and Value of IT Job Opportunities



- IT jobs and skills offer significantly higher salaries over the course of a career
- This is true across industries and roles, but many individuals are not exposed to these opportunities
- As a result, many students are unaware of the true range of opportunities in the IT workforce
- Therefore, educators have an important role to play in communicating the full scope of opportunity in IT to their students

WILL MARKOW: And then the last implication that I'll discuss relates back to much of the findings both around salaries but also around just the magnitude of opportunity outside of tech in general, and that is help to battle some of the misconceptions that people have about job opportunities in IT by communicating some of the strong opportunities outside of the tech workforce and by communicating the strong salaries associated with moving into a career in IT, whether it's in tech or whether it's in a non-tech industry. Students who are empowered with information about the

IT workforce and about the opportunities across different industries in IT are going to be best positioned to make informed decisions as it relates to their education and as it relates to their careers, and that's going to enhance the likelihood that they find sustainable employment opportunities once they graduate.

So, educators have an important role to play in helping to communicate to students the true scope of opportunity and the return on investment that can be associated with learning some of these skillsets, so being able to find opportunities to communicate this information to students, again, is a powerful motivator to help people move into this field.

[00:29:04]

Case Study: How UMUC Drives Enrollment and Engagement by Demonstrating Value

Case Study: How UMUC Drives Enrollment and Engagement By Demonstrating Value



Course Alignment = Advocacy Opportunity

Enrollment Marketing: Burning Glass data not only helped University of Maryland University College develop its highly successful Data Science program but also promote the program based on market relevance.



WILL MARKOW: And before we jump to questions, I'll end on a concrete example of a college that did just that by communicating some of the key opportunities associated with a particular program. In this case, they were looking at data science and analytics-related skillsets that they had embedded in a new program.

We had worked with this University—it was the University of Maryland University College—to help them identify the specific skillsets that were needed within this field so that they could embed them within the program, then also to help them articulate to students the true

magnitude of demand for people with these skills. They were able to take information about where these jobs are required, the overall scope of demand for these jobs, what are the most in-demand skills and the top companies hiring for these skills, and they created a promotional program that they rolled out across the college to communicate the true demand for these competencies to these students.

They found that doing so significantly increased engagement in the programs, significantly increased enrollment, and helped more workers gain the analytics skills necessary to find strong employment opportunities upon graduation. So, I wanted to highlight that as a concrete example of how a school has used this kind of information to help communicate to students the value associated with moving into careers in IT.

[00:30:28]

Questions

WILL MARKOW: So, I will go ahead and stop there. I know we have plenty of time for questions, so I definitely want to open it up to anybody who would like to know more about the research or has any other questions related to the work that we've done. But I'm really glad that I was able to share this information with you, and I hope that it's been helpful for you as well. Now I'm happy to answer any additional questions that have come to mind.

[00:31:19]

STEVE WRIGHT: Well, thank you, Will. First, I want to say I think this kind of study is just fascinating. When you shared that one chart where you compared traditional IT skillsets versus, I think, manufacturing and perhaps finance, the uniquely different IT software development or whatever skillset would rank more highly in each of those different hybrid sectors—that was very interesting.

What we also find ourselves asking when we look at that kind of data is, well, *(for example, in manufacturing) what is the manufacturing skill that we would want to pair with that?* I know I've had conversations with Kaiser, talking about healthcare, and I would show them our IT curriculum, and they would say, "Well, you need to have something on healthcare information workflows." I'm like, "What the heck is that?" So, I think this is a great introduction to now a field of study where we try to identify what these hybrids jobs look like. Do you have any insights on how we might proceed?

[00:32:25]

WILL MARKOW: Absolutely, and I think that's a great point because we often see as well that the top level findings when it relates to what skills are in demand in a particular industry, they're great as a conversation starter with companies to really start to unpack how different skill requirements manifest on the job within a particular company.

So, what we often recommend is that, starting with the dataset, looking at what are the top skillsets that are being required in that industry within in IT, we can see how are different competencies being paired with one another, such as maybe you see data analysis being paired with oil and gas exploration in the oil and gas field, and then you can use that information by taking it to employers in the oil and gas industry and say to them, “How does this manifest? How does somebody need to know data analysis? What kinds of datasets are they working with? Give us a little more insight into how we can help prepare workers for what they’ll actually be doing on the job.”

So, being able to pair some of the quantitative information about what jobs and skills are being demanded and in what combinations within your industry with the qualitative conversations with individual employers can help you to build a more holistic picture of what are the most important skillsets and how do they manifest on the job and how can we help to embed the competencies into our curriculum that are going to help prepare somebody for what they’re actually going to be doing once they enter the workforce.

[00:34:11]

STEVE WRIGHT: All right, I think this is great because we do a lot of outreach to local businesses or regional businesses, and we have advisory groups. Typically, our approach to, say, having an IT advisory group would be to invite tech companies, but I think what you're suggesting is it might be wiser to bring in the non-tech companies to talk about IT.

[00:34:31]

WILL MARKOW: Yeah, I think that’s definitely right. It definitely makes sense to have the tech companies at the table as well, although we do often find that if you have an overrepresentation from one industry or just one type of company, then you're often going to have a so much skewed view of what’s actually needed. So, being able to bring in as diverse a range of companies as possible, both from tech but also from non-tech is going to be hugely beneficial, and I think, in this case, absolutely necessary because we’ve seen that the vast majority of demand for IT workers is coming from those non-tech employers. So, being able to bring them to the table is going to be

critically, especially for community colleges, where they have an even greater demand for somebody who doesn't have a bachelor's degree. I think that's definitely wise to find opportunities to bring the non-tech employers to the table as well.

[00:35:30]

STEVE WRIGHT: I could go on interviewing Will for the rest of the hour, but I'd like to turn it over—anybody listening want to speak up and ask a question? We've also opened the chat to questions. You can see Nicole's response—yes, we will be posting this, and it will be chapterized and transcribed with the links and everything else. So, you'll have all of this information. Who has a question? Do I assume everybody already knew this? I doubt that.

OK, *do you see more jobs going from on-premise versus managed services company?* So, I think that speaks a little bit to outsourcing or contracting. I mean, who would be hiring these people?

[00:36:22]

WILL MARKOW: So, that's a very good question, and we actually do see that the largest individual industry is the professional services industry calling for IT workers outside of the traditional tech industry, and those are usually going to be MSPs or firms that are outsourcing IT functions. That said, even though it is the largest share of employers, it does not make the majority of non-tech job openings.

In addition to the professional services firms or the MSPs, many teams are bringing tech talent in house and building out their tech teams across many different industries. I think especially we're seeing some of the larger companies building out their tech teams in conjunction with increased outsourcing, but we definitely are seeing strong demand within corporations to build out their tech team, and that goes for just about every function. I think that there's probably a little bit more outsourcing for certain fields, such as Cybersecurity, where there's an even more acute talent shortage, but even in Cybersecurity, we see a lot of firms bringing talent in house if they can find it. So, I think the reality is also many of the strongest opportunities for sub-BA

workers or workers without much experience might be in the in-house IT teams, rather than professional services, because many of the professional services firms are looking for somebody with heightened credentials because that's easier for them to sell. Unfortunately, that's often the reality of it, so there might be more opportunities for somebody to look at an in-house opportunity in IT if they don't have a bachelor's degree than if they try to work for one of the MSPs or outsourcing firms.

[00:37:40]

STEVE WRIGHT: *In your research, did you discover anything linking to the value of industry certifications, like the CompTIAs, the Ciscos, and these others in terms of employment?*

[00:38:50]

WILL MARKOW: So, we have seen that, not for this research specifically but for some of the other work that we've done. We have noticed that there is definitely value in many of these certifications. In fact, one of the things that we often find is that being able to help prepare individuals for some of those in-demand certifications, such as CompTIA, Cisco, and some others, can be a strong way of increasing employment opportunities for workers, especially for those who don't have a bachelor's degree, because in IT at least, many of those certifications do serve as a strong proxy for competence that have value in the eyes of employers, and they often come with significant salary premiums. It's sometimes the case that getting a particular IT certification that takes 6 to 12 months can give you the same salary bump as going and getting your bachelor's degree. So, there's definitely value in being able to train for those certifications. The trick is just knowing which certifications are going to be most relevant and most valued in the eyes of employers, given the field within IT that you're looking to pursue.

[00:40:09]

STEVE WRIGHT: *I have another question about agriculture. Sometimes agriculture is excluded from a lot of these analyses—is that included in your view as well?*

[00:40:18]

WILL MARKOW: We did include agriculture. We looked across all sectors in the economy. We didn't just filter out some or ignore others. The agriculture sector, although it's obviously hugely important just on an economy-wide basis, in terms of the actual number of job openings within it, it's usually one of the smaller sectors. They have, for better or worse, done a great job of automating many of the processes that historically took many workers to perform, and much of that is attributable to the IT workforce being able to automate many of those processes.

That said, we still don't see generally as large a demand in agriculture for IT jobs—or any other jobs for that matter—simply because it just isn't hiring on the same order of magnitude as larger industries.

[00:41:19]

STEVE WRIGHT: Well, I think if we change the scope to agrobusiness, everything from the sunbeam to the fork, you know, we get it at distribution and retail and a lot of those other things as well, it would probably be a lot of that. We have another question here about cloud services. We've had a lot of interest in our community college system on cloud computing technologies and an expanding workforce. We have a lot of interest from companies like Amazon with their Amazon Academy and their educational services, as well as Azure, wanting everybody to drop everything else and teach cloud. So, one of the questions we're dealing with is *to what extent is cloud technology or the IT aspects of cloud, which also overlaps with computer science, fall under this umbrella of tech versus non-tech?*

[00:42:10]

WILL MARKOW: That's a good question. I think that we have definitely seen that demand for cloud-related skillsets is increasing dramatically across different sectors. It will obviously manifest a little bit differently in tech versus non-tech in many ways, so if you're working for Amazon, then you're going to be doing something a little bit different than working for the company that is hosting things on AWS, but we definitely have seen that across industries.

Knowledge of the cloud is in strong demand, and we've seen that it's actually the hardest to fill in many cases, so being able to pair, for example, cloud skills with security skills routinely shows up as one of the hardest to find combinations in the market. We see that, similarly, many of the cloud-related jobs and skills are offering some of the highest salaries both in tech and outside of tech, so being able to gain knowledge of some of the technologies associated with the cloud definitely is still coming with a strong premium in terms of salary. So, I think that there's definitely some evidence in the data to back up that there's increasing demand for cloud across a broad swath of industries.

[00:43:54]

STEVE WRIGHT: I guess the thing about cloud is there are the different layers—platform and infrastructure as a service or software as a service—and you mentioned ERP, which I believe is the Oracle term for Enterprise Resource Platform or whatever. *There are a lot of cloud services that end up being in non-tech companies, Salesforce.com being another one. What are the technical components of that? I know there are different certifications, Salesforce Administrator or whatever—is this a ripe market for IT employees in non-tech industries?*

[00:44:33]

WILL MARKOW: I think that it is. Salesforce is actually a great example because we have done some work looking at demand for Salesforce-related skills since it has one of the larger ecosystems out there, and we have found that there's a pretty diverse range of roles, ranging from Salesforce Administrators to Developers and other jobs associated with implementing the technologies that are often available to sub-BA workers. I think it's often the case that when you have something like a Salesforce that is a SaaS tool that is widely adopted, you start to build out an ecosystem of people who are leveraging the tool and need to be able to implement it across a broad range of companies.

So, in many of those, people are going to... Many of those job opportunities are open to somebody who doesn't have a bachelor's degree, so I think that you can almost think of it a little bit like when Ford was first rolling out their cars, you started to have a broader set of people who

knew how to maintain them. You had the mechanics who could work on Ford cars and eventually other cars as well, and I think, similarly, you could build out a large ecosystem of people who know how to maintain and develop upon tools such as Salesforce or other SaaS-related products and build out a large ecosystem of trained individuals who are highly specialized in those products.

[00:46:21]

STEVE WRIGHT: Well, we have some more questions here, and we'll get to them, but I just can't help but pause and thank you for helping us get a better view of where these jobs are. We have a lot of people in the community college system that automatically go to Facebook and software development as the go-to as that's what IT is, and you're really helping us understand that, while I know for middle-skill jobs and people... I love the term 'sub-BA'—I don't think I've ever used that before. A lot of people who are aspiring to get good work, there are a lot of different alternatives, and we would be doing them a better service perhaps if we understood these hybrid niches and how to train them for it. It's sounding like it's a combination of the data the you're supplying and talking about as well as going out to our local employers and saying, "What does this look like to you?" It's an interesting role that we're in, and we enjoy it, but it's your kind of insight that helps us a lot, and I want to thank you for that.

We have a question here from Liz on quantum technologies—OK, Liz, you certainly stumped me with that one. Is that part of IT?

[00:47:38]

WILL MARKOW: So, that's a really interesting question, actually, and I think quantum computing is part of IT. It's still very early on, and I think that nobody really knows exactly how it's going to be deployed and how much of an impact it's going to have across the market. Right now, it's very much still in the R&D phase, and I think that the challenge to making it more accessible and building it to the point where it actually has more impact across the workforce is getting the technology to a point where you can start to have programming languages on top of it. There's still no assembly for quantum computing. They're in the process of building that, but it's not quite

at the point where we can have an ecosystem of developers in the same way that you could for computers a few decades ago, just when the present computing revolution was masoned.

I think that there is a lot of question around how can quantum be fully leveraged and be valuable to businesses, and I think that until those questions are fully sorted out, there is going to be a minimal impact on the workforce immediately, but I think once there's a platform to help people leverage it more effectively (it's probably going to be through the cloud, as it is now), then I think once you have that infrastructure in place, then it's going to be much easier to see how it's going to benefit businesses and how it's going to impact the workforce. But I think at this point, it's still pretty early on, and we haven't seen too many companies, other than the firms that are actually investing in building the technology, spend much effort on adopting quantum-related technologies.

[00:49:53]

STEVE WRIGHT: I have one more question, and that has to do with how you see the IT profession, if it is such a thing, evolving. I mean, I can remember the days when the IT guy was the guy who assembled your computer in your work cubicle, and you shoved in a whole bunch of discs to try to upload Microsoft. OK, things have obviously changed a lot since then, and now, with Cybersecurity and Internet of Things, we're seeing more and more jobs require a bachelor's degree and a number of other hybrid skills, like project management and maybe more leadership qualities. *Do you have a picture from some of the work that you've done of how the IT role has evolved and will continue to evolve in the next, say, 10 years?*

[00:50:38]

WILL MARKOW: That's a really interesting question. I think, if I were to try to boil it down to just one or two thoughts, I would say that we're really seeing a blurring of lines between IT and the rest of the enterprise, and that manifests in two ways. I think one is you see increasingly that people in disparate fields across an organization need to have some IT-related competencies. I mentioned earlier, if you're in marketing, it's no longer the case that you just need to be able to

write marketing copy—you also need some data analysis skills and some market research skills, and you need to be able to work with a large number of technical tools.

So, on the one hand, you see many non-tech roles increasingly interacting with tech, but that also has spillover effects where then the tech teams need to be able to speak the language of everybody else in the organization, so you see this breaking down of silos where people outside of tech need to understand tech, and people in tech need to understand the rest of the business context in which they operate. I think that, in a broad sense, we're seeing that tech workers are increasingly being asked not just to have technical skillsets but to also have strong communication skills and business-enabling skills so that they can clearly communicate how the work that they're doing is impacting the broader enterprise.

So, that's one. I think that we're also seeing much more specializations within tech. It used to be the case, as you said, that there might be one or two tech workers at a company, and then they had to be jack-of-all-trades folks, but as IT and digital technologies are spreading across the enterprise, there's much more specialization, and there are many more opportunities for workers to isolate a discreet set of skills, whether it be related to cloud or Salesforce or Cybersecurity or any other subdiscipline within IT, that if they build those skills into their portfolio and start to specialize in those functions, they can increase their earning potential and their employment opportunities. So, I think that those are two of the general trends, both that blurring of lines across IT and non-IT but also the specialization and the need for people to develop more pointed skillsets. Those have been two of the trends that we're seeing across IT more broadly.

[00:53:39]

STEVE WRIGHT: Well, now if we can only get our academic departments to blur their lines a little bit, then we'd be in a good place! All right, I don't see... I'm not sure if I'm missing any questions here that should be asked—Nicole, let me know if I am—but I think that just about wraps it up. I want to thank you, once again, for a very insightful presentation, and we have a lot of challenges in front of us to try to take the kind of information you've given to us and turn it into pathways, whether it's for our entry-level students or for our upskillers who come back to us and want a little

IT refresher because now, all of a sudden, they realize they need to know IT. So, it's very helpful to know! That one statement, 90% of IT jobs are in non-tech industries, is pretty much the clarion sound that we needed to hear to wake us up and start looking in this area. I want to thank you very much for doing that work and sharing it with us today.

[00:54:36]

WILL MARKOW: My pleasure. Thank you so much for inviting me on. I really enjoyed being able to share some of the research, and if there are any additional questions that come up afterwards, please feel free to reach out.

[00:54:46]

STEVE WRIGHT: We'll forward them on. Thank you very much, Will. Thank you everybody for joining us. We'll be sending out notices about what our agenda and lineup will be for January very shortly. Thanks for giving us a good year on the ICT Educator Series. Take care.