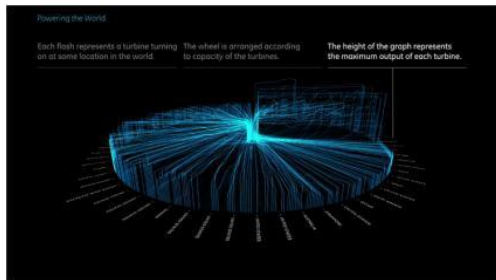


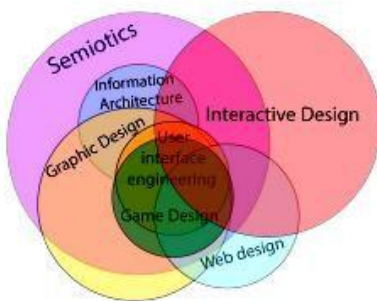
1. For an IT graduate (whether a 2- or 4-year degree) about to enter the workforce, we asked our IT Professionals what are the top five IT courses and subsequent IT concepts/competencies they should have mastered? For example, networking, programming, database design/development, etc.

1. IT and Computer Science (CS) Competencies



Database Design/integration: Data is big right now. IT students, whatever the concentration they elect to focus on, need to understand how to build a database, as well as produce database models. Data is driving business decisions and it has become increasingly visual. Data visualization is essentially descriptive statistics which result in a visual representation of data. It's often described as telling a story using data. One of the courses IT professionals consistently recommend is statistics. It can never be overstated how important statistics is for a student who wants to create an understanding of logic and applied mathematics to build upon for more advanced IT coursework.

IT students are typically introduced to database basics by Microsoft's Excel and Access. Here is a [list](#) of the most popular and widely used database software systems, including SQL (one of the most widely used open source database). NoSQL (relational database management system – RDMS) is new to the game of database design and management.



Interactive Design is a “user-oriented field of study that focuses on meaningful communication of media through cyclical and collaborative processes between people and technology. Successful interactive designs have simple, clearly defined goals, a strong purpose and intuitive screen interface.” (Source: [Wikipedia](#))



Mobile Operating Systems (OS) and Platforms: There are a number of operating systems that support mobile devices, smartphones, tablets, etc. The most common OS's are Android (Google), Blackberry, iOS (Apple), Windows (Microsoft), and *all others* (Ubuntu, Firefox, etc.) Look here for the [Mobile Platforms](#) to watch for the second half of 2014. Find out how a non-profit in Queen's New York taught people to create [iPhone apps](#) — and their incomes jumped from \$15k to \$72k.



Networking Fundamentals: “A computer network or data network is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. The connections (network links) between nodes are established using either cable media or wireless media. The best-known computer network is the Internet.” (Source: [Wikipedia](#))



Operating Systems (OS): In Garner's chart the following percentage increases/decreases could be used to anticipate which languages might be increase/decrease in popularity in the future.

Worldwide Device Shipments by Operating System (Thousands of Units)

Operating System	2012	2013	2014	2015
Android	503,690	877,885	1,102,572	1,254,367
Windows	346,272	327,956	359,855	422,726
iOS/Mac OS	213,690	266,769	344,206	397,234
RIM	34,581	24,019	15,416	10,597
Chrome	185	1,841	4,793	8,000
Others	1,117,905	801,932	647,572	528,755
Total	2,216,322	2,300,402	2,474,414	2,621,678

Source: Gartner (December 2013)

Gartner's market forecast data is detailed in "Forecast: PCs, Ultramobiles, and Mobile Phones, Worldwide, 2010-2017, 4Q13 Update" and available on the Gartner web site at <http://www.gartner.com/doc/2639615>.

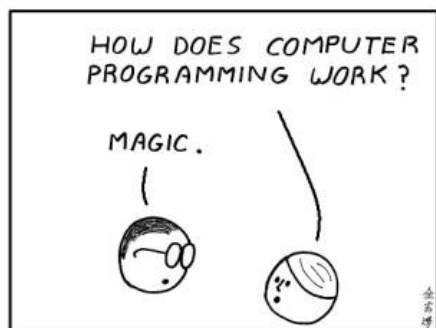
Overall, the total device shipments by OS looks to increase by almost 6% between now and 2015, but it's actually a smaller increase than between 2013 and 2014 at 8%.

Projected increase/decrease for the six Oss is as follows:

- Android 4%**
 Android runs the Linux kernel (similar to the Unix OS) and its user interface works with direct manipulation (for the touch screen's mobile devices, as well as tablets use). Linux uses free, open source software for its OS software development. Android's programming languages are C, C++, and Java.
- Windows 17.5%**
 Microsoft's Windows OS did not begin as a full operating system as it extends MS-DOS. However, it's gone through multiple iterations to become a fully integrated operating system. It's written in Assembly, C, C#, C++. The C programming languages (including, C++) has both open source and proprietary implementations that share an open standard.
- iOS/Mac OS -14%**
 This is a surprising projected decrease. iOS runs on a Unix-like OS, and uses C languages, Objective C, and Swift. Swift is the Apple-created compiled programming language that's been developed to replace Objective C.
- RIM -31%**
 RIM is Blackberry's operating system. It's a closed source and written in C++. The decrease isn't surprising given the problems Blackberry's been experiencing over the last few years.
- Chrome 67%**
 Google's Chrome's OS is similar to Android's in that it runs the Linux kernel. It uses the C and C++ programming languages. It was built using an open source project, Chromium OS. The projected increase is large.

- Others 8%

Take Aways: While there is always talk of overtaking the C-family of programming languages, looking at the commonality of all these operating systems, it appears the C program language fuels 100% of the OSs listed above (not including “Others” which was not defined by Gartner).



Programming and Scripting: This is for our IT educators, and it’s an important point to consider. There are no shortcuts in teaching someone how to program, as it still requires educators to teach students **how** to program. Perseverance, on the part of students, studying programming is requisite. Here’s why.

“For the past 50 years, programmers have tried to make it easy for people to learn programming, and for 50 years they've succeeded -- but only at teaching the most basic tasks. Ninety-five percent of the world may be able to figure out if-then-else structures, but that's not the same thing as being a programmer.” (Source: [InfoWorld](#))



Security: “Data loss”, “data breach”, “abuse of cloud services”... It all sounds ominous. Network security, specifically **security for the cloud**, is important. The Cloud Security Alliance listed the “notorious nine” threats. This is a well-organized and succinct [overview](#) of the nine security threats to the cloud. Anyone can quickly assess what the threats are just by reviewing the table of contents. However, as it’s only 19 pages, it might be worth reading.

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Systems Analysis: “The system development life cycle (SDLC) is the traditional system development method that organizations use for large-scale IT Projects. The SDLC is a structured framework that consists of sequential processes by which information systems are developed.

1. System Investigation
2. System Analysis
3. System Design
4. Programming and Testing
5. Implementation
6. Operation and Maintenance”

(Source: [Wikipedia](https://en.wikipedia.org/wiki/System_development_life_cycle))



Website Design, Development, Maintenance: Five years ago (at the earliest), a college student, who was thinking about web design as a possible career pathway, might have thought it entailed:

- graphic design,
- learning how to use Adobe products like Illustrator and Photoshop,
- a markup language, HTML, and cascading style sheets (CSS).

Today’s reality is far different. **Web Design’s** occupational requirements now demand mastery of a large and sophisticated set of technical knowledge and skills. These skills include software development, which means knowledge of a programming language, (like the widely used JavaScript), application development, [user experience](#), database design and development, security, and more...

[Read](#) about the transformation and expanded expectations of how the occupational title

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“web designer”. It is helpful from an academic or professional technical program development perspective. It is also helpful for students to understand how this occupation has both broadened and deepened. For a list of **18 Pivotal Web Design Trends of 2014**, read [here](#).

2. Employability Skills



Courtesy of: [The University of Kent](#)

What are employability skills, and why are they so important? “ A group of essential abilities that involve the development of a knowledge base, expertise level and mindset that is increasingly necessary for success in the modern workplace. Employability skills are typically considered essential qualifications for many job positions and hence have become necessary for an individual's employment success at just about any level within a business environment. ”
(Source: [Business Dictionary](#))

Employability skills are a key factor when an employer looks at a resume, and then invites you to an in-person or group interview. It plays a major part in their decision to hire the IT graduate/job seeker. Employers indicate that over 50% of their decision to hire an IT worker is because they have the employability skills they're looking for. Even though this [Exeter UK](#) chart of employability skills aligns to secondary activities, where evidence and demonstration of that skill can be found in a student's lesson outcome, it's still a good representation of how these skill might be integrated into a course.

The following were considered to be essential **employability skills** for an IT student and graduate by our IT industry professional panel:

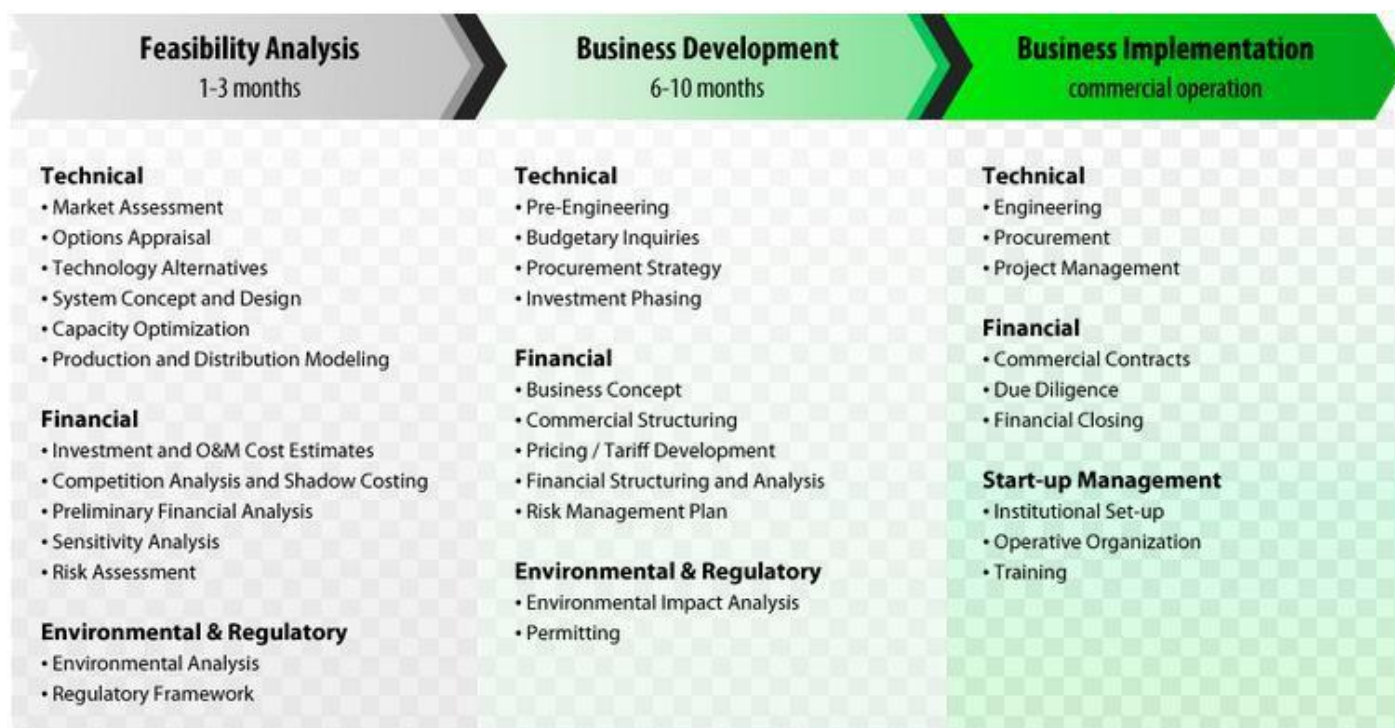
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- Accounting Fundamentals (how to manage a budget, cost something out, etc.):** While accounting is typically housed in a professional and technical program or used for business-transfer students, accounting principles are highly applicable for IT students. Some of the key components of IT include explaining the return on an investment (ROI). “If we decide to go with this software package systems-wide, how much will it cost? Will this investment ultimately increase performance, productivity, and save us money?” is a question that may sound like one only the management-level professional would have to answer. They typically will ask for the opinions of their team. “We have to spec out this project. Can you tell me how many hours it will take you, given your current hourly salary, plus benefits? Be sure to factor in a markup of 20%?” could be a question sent by the project-lead, via email, to a group of IT workers. Would an IT graduate from your college’s IT program be able to answer these questions? One of the employability skills connected to accounting fundamentals is project management. It’s another one of those skills employers are looking for.

Covering even a few accounting basics within the IT courses taught, as well as embedding a few principles as learner outcomes in a project, could make a difference in an IT student’s workplace success.

Looking at this high-level financial process planning, the link between IT, financial analysis, and project projections has relevant implications for IT graduates and workers.



Career Planning: When you have read the profile of [Bryan Stevenson](#) (**Section 6**), you will see that one of the overlooked areas for many IT students is aligning career goals with academic choices. Students should know how to create opportunities that translate into being seen as a desirable prospective employee. Students need resources as well as guidance in figuring out the * different IT jobs out there, * what they require in terms of technical knowledge and skills, * what the work will actually be like, and, * how much the job will pay.



An excellent resource for IT students is the website YourFuturein.IT. It's the **IT Resource for Students in Washington State** with academic planning guides, career tips, a search-engine for all the IT degrees/certificates in Washington State, as well as an IT interest quiz, and detailed information about different IT occupations (including duties, pay, etc.)



Communication: Look at any IT job posting and see the following requirements listed:

- “Possess excellent oral and written communication skills, including the ability to interface with senior managers”

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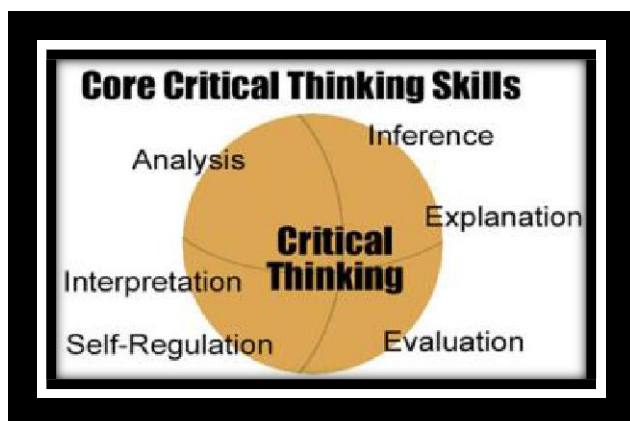
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- "...this is complemented by outstanding listening skills as well as excellent written and verbal communication skills"
- "Strong presentation and communication skills"

Communication is included in 1,054, or 47% of all of the IT jobs posted on Dice.com (for Washington State). And, for the 43% of jobs that didn't include it, the employer will still expect it. They are probably assuming a college graduate, and now prospective employee, would understand how important effective communication skills are.



IT educators can use [this resource](#) to weave within the hands-on and applied technology concepts they are teaching, the different communication skills IT employers are looking for.



Critical Thinking: Everyone always talks about how important critical thinking skills are. However, there is something vague about this term, as there are a myriad of definitions out there.

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What does it really mean? And, can it be taught? The following definition seems to capture the essence of critical thinking.

“Critical thinking is the ability to think clearly and rationally. It includes the ability to engage in reflective and independent thinking. Someone with critical thinking skills is able to do the following:

- understand the logical connections between ideas
- identify, construct and evaluate arguments
- detect inconsistencies and common mistakes in reasoning
- solve problems systematically
- identify the relevance and importance of ideas
- reflect on the justification of one's own beliefs and values”

(Source: [Critical Thinking](#))

CRITICAL THINKING SKILLS				
1 Knowledge Identification and recall of information	define fill in the blank list identify	label locate match memorize	name recall spell	state tell underline
	Who _____? What _____? Where _____? When _____?		How _____? Describe _____? What is _____?	
2 Comprehension Organization and selection of facts and ideas	convert describe explain	interpret paraphrase put in order	restate retell in your own words rewrite	summarize trace translate
	Re-tell _____ in your own words. What is the main idea of _____?		What differences exist between _____? Can you write a brief outline?	
3 Application Use of facts, rules, and principles	apply compute conclude construct	demonstrate determine draw find out	give an example illustrate make operate	show solve state a rule or principle use
	How is _____ an example of _____? How is _____ related to _____? Why is _____ significant?		Do you know of another instance where _____? Could this have happened in _____?	
4 Analysis Separating a whole into component parts	analyze categorize classify compare	contrast debate deduct determine the factors	diagram differentiate dissect distinguish	examine infer specify
	What are the parts or features of _____? Classify _____ according to _____. Outline/diagram/web/map _____.		How does _____ compare/contrast with _____? What evidence can you present for _____?	
5 Synthesis Combining ideas to form a new whole	change combine compose construct create design	find an unusual way formulate generate invent originate plan	predict pretend produce rearrange reconstruct reorganize	revise suggest suppose visualize write
	What would you predict/infer from _____? What ideas can you add to _____? How would you create/design a new _____?		What solutions would you suggest for _____? What might happen if you combined _____ with _____?	
6 Evaluation Developing opinions, judgements, or decisions	appraise choose compare conclude	decide defend evaluate give your opinion	judge justify prioritize rank	rate select support value
	Do you agree that _____? Explain. What do you think about _____? What is most important?		Prioritize _____ according to _____? How would you decide about _____? What criteria would you use to assess _____?	

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The following [resource](#) and Critical Thinking Planning Guide (above) can be used by both IT educators and students to use in IT courses in order to build a critical thinking improvement plan. (Source: [Educational Technology and Mobile Learning](#))



Flexibility: Think of flexibility as in opposition to the following verb, [rigid](#). In researching “flexibility” and “employability skills,” it is worth noting the United Kingdom (UK) has spent sizeable time and effort creating a wide body of employability skills resources. Washington State could benefit from reviewing and implementing the UK’s body of research and work in this area.

According to Tony Allesandra, author of *The Platinum Rule*, “High flexibility is characterized by these five attributes: confidence, tolerance, empathy, positivity, and respect for others.” Ms. Allesandra also gives examples of the flip side of flexibility:

- Rigidity—“It’s my way or the highway”
- Competition with Others—“I’m smarter, prettier, etc., than you”
- Discontent—“No, I don’t like it this way. Why can’t we...”
- Unapproachable—“Don’t bother me unless it’s worth my time and you agree with me”
- Difficulty with Ambiguity—“Let’s nail this down right now”

Given how the IT industry’s mindset is “rapid change drives innovation”, it’s vital faculty help students understand that this is part of working in the technology industry. Students need to be prepared to *embrace* flexibility.



Meeting Basics (What should be on the agenda? Who is the lead? Why have a meeting? Is it informational or a working meeting? What are the outcomes? etc.): Meetings are an inevitable part of the employee experience. They are also an

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effective way to create a cohesive vision on how to move things forward. In IT, especially, meetings happen using a myriad of different platforms: 1on1 or group meetings can take place in-person, on the phone, web(inars). And, one of the elements of a meeting, making a decision(s), in many instances been offloaded through the poll and survey tools, email, etc.

Things to consider when either attending or heading a meeting are succinctly summed up by Neal Hartman, Massachusetts Institute of Technology (MIT), who contributed this [piece](#) to Forbes.com's, **Leadership Forum**. He writes,

1. Make your objective clear
2. Consider who is invited
3. Stick to your schedule
4. Take no hostages
5. Start on time, end on time
6. Ban technology
7. Follow up

Note: These elements should also be considered from the viewpoint of the meeting attendee. And, while number 6, “Ban technology” sounds counterintuitive, at least consider the rationale.

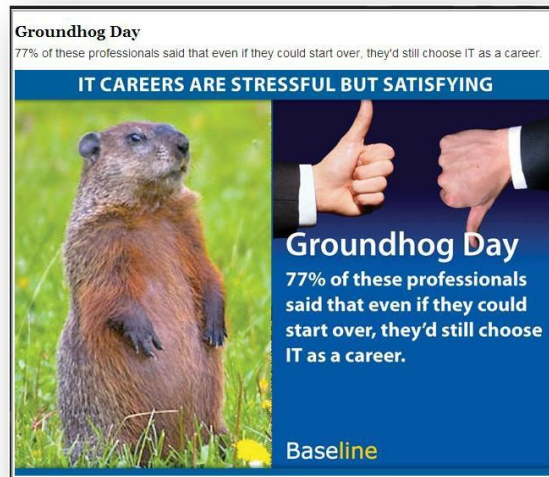


The Modern Workplace Culture: When reading [Bryan Stevenson's interview](#), consider his thoughts on why it's imperative to pay attention to the culture of the organization when applying for a job. IT students, and subsequent graduates, need to do their homework. They should research any and all pertinent information about the company. It's always advisable for students, when doing their research about a prospective employer, to understand what the company's **vision, mission, and values** are. Try keyword searches for elements of a work environment tied to the company's name and see what pops up. **Use LinkedIn** to see who works at the prospective employer's company to find out if there are any indicators about their satisfaction with company's workplace culture. Increasingly, IT students should also be aware the IT industry has moved towards meeting its employment needs with the contract worker. IT students would be well advised to read about [Bryan Stevenson's experience](#) as an IT contract worker.

Something else for IT faculty to disclose to their students is stress is part of the IT employment landscape, just as it's part of any job. It's a key attribute our IT professionals identified. IT workers either are comfortable with, or adapt to, the sometimes ambiguous nature of technology and the associated stress.

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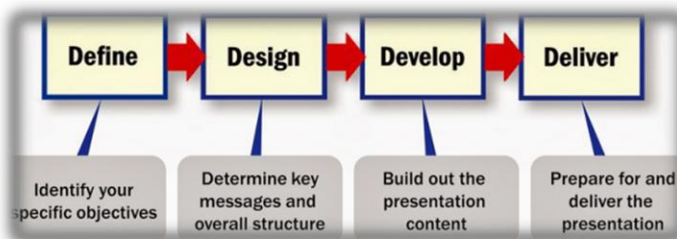
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As recent as June 6, 2014, Baseline.Com, reported out on IT workers experience as an IT employee:

- **Fair Trade-Off:** 58% have at least considered taking a new job that would pay less in order to escape their current stress level.
- **Stressful Aspects of Being an IT Pro:** Keeping up with requests/workload: 31%, Keeping up with technology: 28%, Impact on work-life balance: 23%
- **Total Access:** 36% said they're expected to be available 24/7 during a work week, and 23% are expected to provide the same availability while on vacation.
- **Thumbs Up:** 40% of these IT pros said their current work is the most satisfying of their career.
- **Professional Pride:** 60% said they're proud they chose IT as a career and are also proud of their current role, assignments and responsibilities.
- **Groundhog Day:** 77% of these professionals said that even if they could start over, they'd still choose IT as a career.

(Source: Baseline.com)



Presentations: Presentations have become common place in the IT world. And, IT students need to be prepared. Succinct public speaking and being comfortable with it, both extemporaneously and as part of a formal/informal presentation, is requisite for the IT employee. So, encouraging students to start making presentations (whether persuasive, factual, informative, etc.) during their college experience is essential.

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One resource for both faculty and IT students is Ted Talks. Amy Cuddy, a renowned social psychologist, gives [an insightful presentation on body language](#) that takes twenty-minutes to watch; it's worthwhile viewing. Watch how she moves around the stage, and realize with most successful presentations, they take time, practice, and require comfort with the subject matter.

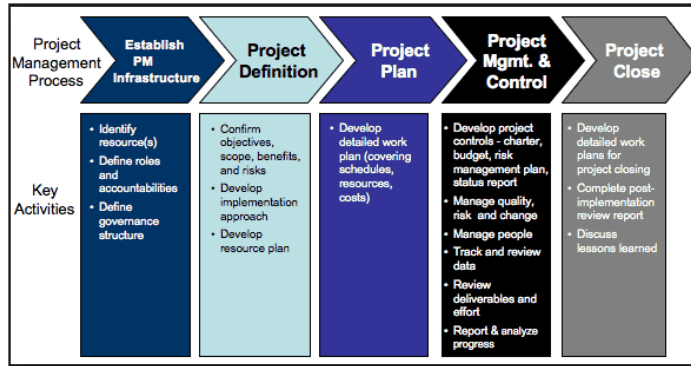


Another recommended resource, and this comes from Dan Pink's book, *To Sell is Human*, (this book is an important one to read to build presentation skills), IT students can improve their PowerPoint (PPT) presentations after they have reviewed, [pecha-kucha](#). It's an international PPT movement that has given new life to the often dreaded PPT presentations. The formula is 20X20 (20 slides X 20 seconds of speaking=6 minutes and 40 seconds).



Professional Networking (LinkedIn.Com): Besides opening a [LinkedIn account](#) (LinkedIn is the most widely used professional networking site out there, and has over 150 million users), IT students should consider how networking increases their job prospects. When a student (who must be 18 or over) joins LinkedIn, there is a wide array of groups (like android developers, network security specialists, etc.), they can participate in. These groups can offer insights on job postings and provide opportunities to connect with recruiters. And, internships as well other job openings, are posted on LinkedIn.

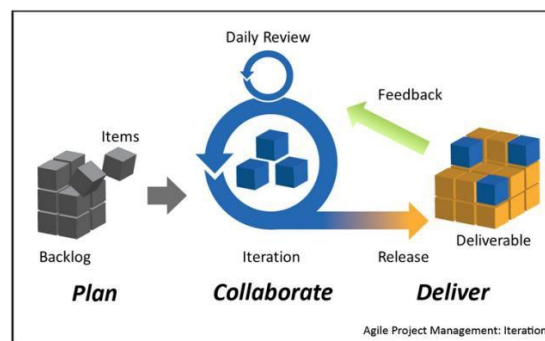
IT students who are about to look for a job or, other work-based learning opportunities should ensure they are knowledgeable about the latest developments in the tech world. Ways to do this include looking through Dice.com's [Tech Blog](#), which has excellent daily reports on a variety of IT topics. [ComputerWorld](#) and [InfoWorld](#) are also good online resources.

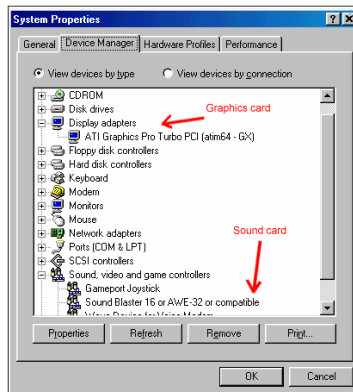


Project Management: There are a variety of IT-specific project management (lifecycle) processes that are used in the IT world. Some common processes and products include products from Oracle, Microsoft, and IBM. [Agile](#) and [Scrum](#) are two of the most widely used life cycle process products used during an IT project, specifically software development projects.

IT students can quickly assess their understanding of what a project manager is thinking about when they launch a project. Even if they aren't going to be managing a project, viewing the different components of what the expectations are as a project team members is a good starting point. [Mind Tools](#) has a project management [assessment tool](#) worth investigating, and a robust summary of the different elements of project management.

A significant consideration for an IT student, whether they are either working on a project team or managing the project itself, is that there are a number of different moving parts. In some ways it's like trying to put together a moving jigsaw puzzle. IT students should be aware that some of the different elements include: working with team members who: have different areas of expertise, work in assorted locations (sometimes even different states or countries), possess varying work styles, are culturally diverse, and may have different goals.





Troubleshooting: [Troubleshooting](#) is both a technical skill and an employability skill. Troubleshooting in the IT world is typically associated with [hardware](#), networking, software, systems, etc. IT students should understand customer service often plays a large role in successful troubleshooting efforts. So, there is not only technical knowledge needed, but being able to incorporate active listening, proper documentation, patience, and clear communication are all essentials of effective customer service. There are a number of troubleshooting forums and vendor-specific resources online. Here are a [simple series of steps](#) to consider when troubleshooting an IT problem.