SPECIALIZED KNOWLEDGE AND FORMAL EDUCATION

Explain that this isn't common sense: its acquired through intense study

Most people see IT as a profession that magically knows all the functions of the phone system whereas some people think rebooting a computer is the worst advice that you can give them and it doesn't fix anything. This belief is entirely misleading and it's undermining to an IT professional, IT is the pinnacle of the modern world covering all technical means used to handle information and aid communication.

Conceptually IT is one of the most complex professions in the modern world consisting of IT personnel that's involved virtually in every aspect of modern computing, from designing computer systems and computer networks to helping users troubleshoot technical problems. The IT profession isn't just based on everyday logic or common sense but requires soft skills such as strong communication, problem solving and adaptability to tackle responsibilities like:

Designing, implementing and evaluating computer-based systems, processes, components and programs.

Analysing technical problems and identifying computer requirements to solve these problems with appropriate IT solutions.

The role of formal Education in IT Degrees:

Formal education builds a strong theoretical foundation-especially in fields like computer science, software engineering and IT.

Computer Science:

Cultivating Adaptability: students preparing for jobs that are yet to be imagined need to know how to grow into the roles available to them. Future-ready skills now entail knowing how to learn, adapt and embrace change and ambiguity especially in the face of technological advancements.

Developing computer science skills: future readiness also comes down to computer science skills used across a variety of domains that fall outside the computer science field including programming, web development, robotics and data analysis.

Software Engineering:

A formal education can provide a more structured learning environment and the opportunity to learn from experienced instructors.

Obtaining a bachelor's degree in Computer Science or Software Engineering provides a strong theoretical foundation, broad knowledge of complex systems and skills in programming, design, and the mathematics essential for solving challenging problems in the field.

IT Degree:

Despite the duration you spend obtaining a degree the important element is the knowledge you learn during your years that would be beneficial to you and would prepare you when you do your job. You might not get the same level of position that your experienced and formally educated peers would have but you can at least start somewhere.

Importance of continuous learning due to rapid technological change:

Continuous learning empowers IT professionals to thrive amid technological advancements. This commitment to growth yields benefits that resonate across problem-solving, professional networks, market relevance and personal satisfaction.

- Enhanced Problem solving and innovation: Gaining exposure to new tools and methodologies refines analytical skills and cultivates a creative mindset. Mastering emerging technologies such as cloud platforms or cybersecurity techniques enables professionals to troubleshoot issues effectively and design innovative solutions.
- Career Resilience and Advancement: Regularly updating ones' skills increases job security while unlocking opportunities for leadership and specialized projects.
- Expanding Professional Networks: Continuous learning environments such as workshops, certifications and online communities foster valuable connections among peers and industry leaders. Effective networking consistently accelerates career growth and fosters collaborative and expanding opportunities.

IT connections

Theory behind algorithms and data structures:

A data structure is a method of organizing data in a virtual system.

An Algorithm is a sequence of steps executed by a computer that takes an input and transforms it into a target output.

To master data structures and algorithms' a combination of theoretical and practical application is necessary including engaging in coding exercises and algorithm challenges is vital for developing proficiency in this area.

Theoretical:

- Mathematical foundations: The analysis of algorithms often involves mathematical concepts such as Big O notation which describes the efficiency and scalability of algorithms.

Practical:

- Implementation: Knowing how to implement various data structures and algorithms in a programming language is crucial. This requires hands on coding practise.
- Optimization: Often you need to optimize solutions based on the constraints of a problem which requires practical experience.

The reason why Google can find results in a split second is because engineers designed and optimized algorithms based on years of theoretical research.

The science of networking: TCP/IP Protocols

Networking is a science. Its layered, abstract and absolutely essential to every modern digital service.

TCP is responsible for ensuring data can be sent reliably over the internet.

And IP refers to the way the computers communicate online and assigns addresses to each computer so they can send and receive data.

Networking isn't just plugging in a router or connecting to Wi-Fi. In the background its built on complex models and protocols like the OSI model which is a theoretical framework that divides network communication into seven layers with its own function.

It's mainly used for teaching, analysis and troubleshooting. TCP/IP is none other than a practical four-layer model that forms the foundation of the internet. TCP/IP is implemented in real world systems and drives nearly all modern networks.

Zoom feels instant but what's actually happening is that your audio and video data is being broken into packets and sent across dozens of servers and networks across the globe.

The principles of Cybersecurity and Cryptography:

Cybersecurity refers to a process of keeping networks, devices, programs, data secret and safe from damage or unauthorized access.

Cryptography is a process of keeping information secret and safe simply by converting it into unintelligible information and vice-versa.

Cybersecurity is both theoretical and practical, for individuals who obtained a Bachelor of Science they acquire the theoretical and practical knowledge needed to strategically assess, plan, design and implement effective cybersecurity defences.

Cryptography is both theoretical and practical theoretical cryptography focus on the abstract mathematical concepts, definitions and rigorous proofs of security for various cryptographic tasks

Example Online banking every time you check your balance or make a transfer encryption is what keeps that data safe while it travels across the internet.

Or the 2017 Equifax hack where over 140 million people's personal data was exposed these breaches happen because companies lack properly trained cybersecurity experts who understand both the theory and the practise of protecting information.

This further supports the idea that IT is built on specialized, theoretical knowledge that demands serious study and training.

The need to constantly learn new languages and frameworks:

The practise of an ongoing proactive pursuit of new knowledge and skills to keep peace with rapid technological changes.

Continuous learning is the process of learning new skills and knowledge on an on-going basis. Learning needs to be on a flexible, on-demand and continual basis in order to contribute this kind of cutting-edge performance in organizations.

It's not just enough to just 'use' a new tool. You need the foundational knowledge to evaluate and integrate it into systems responsibly and securely.

Example a company wanting to utilise cloud to improve performance and reduce costs leads to adopting tools like Azure using container orchestration with Kubernetes and re-architecting their software. You need people who understand both the old and the new systems and who can apply theoretical knowledge to make everything work together. This type of migration requires a deep understanding and strategic thinking.

Formal education gives you the mindset, discipline and problem-solving skills to stay current. And in a field that changes every year, that ability to continuously learn is not optional-it's essential.

(Peter-Spiceworks, 2018)

(Team, 2022)

(Matus, 2022)

(Geeks, 2025)

(future, n.d.)

(group, 2025)