Lesson Proper for Week 17

EMERGING TECHNOLOGY

Emerging technology is a term generally used to describe a new technology, but it may also refer to the continuing development of an existing technology; it can have slightly different meaning when used in different areas, such as media, business, science, or education. The term commonly refers to technologies that are currently developing, or that are expected to be available within the next five to ten years, and is usually reserved for technologies that are creating, or are expected to create, significant social or economic effects.

Emerging technologies are characterized by radical novelty (in application even if not in origins), relatively fast growth, coherence, prominent impact, and uncertainty and ambiguity. In other words, an emerging technology can be defined as "a radically novel and relatively fast-growing technology characterized by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) which is observed in terms of the composition of actors, institutions, and patterns of interactions among those, along with the associated knowledge production processes. Its most prominent impact, however, lies in the future and so in the emergence phase is still somewhat uncertain and ambiguous.

The top 10 Emerging technologies for 2020s

1. Bioplastics for a circular economy

Less than 15% of the world's plastic is recycled, with the rest incinerated, abandoned or sent to landfill. Biodegradable plastic offers a solution but lacks the strength of conventional materials.

2. Social robots

Today's robots can recognize voices, faces and emotions, interpret speech patterns and gestures, and even make eye contact. Droid friends and assistants are becoming part of everyday life and are being used increasingly to care of the elderly, educate children and undertake all sorts of tasks in between.

3. Metalenses

Making the lenses used by mobile phones, computers and other electronic devices smaller has been beyond the capabilities of traditional glass cutting and glass curving techniques. But advances in physics have led to miniaturized, lighter alternatives to established lenses, called metalenses. These tiny, thin, flat lenses could replace existing bulky glass lenses and allow further miniaturization in sensors and medical imaging devices.

4. Disordered proteins as drug targets

"Intrinsically disordered proteins" are proteins that can cause cancer and other diseases. Unlike conventional proteins, they lack a rigid structure so change shape, making them difficult to treat. Now scientists have found a way to prevent their shapeshifting long enough for treatment to take effect, offering new possibilities for patients.

5. Smarter fertilizers

Recent improvements in fertilizers have focused on their ability to slowly release nutrients when needed. However, they still contain ammonia, urea and potash which damage the environment. New fertilizers use more ecologically friendly sources of nitrogen, and microorganisms that improve take-up by plants.

6. Collaborative telepresence

Imagine a video conference where you not only feel like you're in the same room as the other attendees, you can actually feel one another's touch. A mix of Augmented Reality (AR), Virtual Reality (AR), 5G networks and advanced sensors, mean business people in different locations can physically exchange handshakes, and medical practitioners are able to work remotely with patients as though they are in the same room.

7. Advanced food tracking and packaging

About 600 million people eat contaminated food each year and it's essential to locate the source of an outbreak immediately. What used to take days or even weeks to trace can now be tracked in minutes, using blockchain technology to monitor every step of a food item's progress through the supply chain. Meanwhile, sensors in packaging can indicate when food is about to spoil, reducing the need to waste whole batches once an expiry date is reached.

8. Safer nuclear reactors

Although nuclear power emits no carbon dioxide, reactors come with a safety risk that fuel rods can overheat and, when mixed with water, produce hydrogen, which can then explode. But new fuels are emerging that are much less likely to overheat, and if they do, will produce little or no hydrogen. These new configurations can replace existing fuel rods with little modification.

9. DNA data storage

Our data storage systems use a lot of energy and can't keep up with the vast - and ever-increasing - quantities of data we produce. In less than a century they are set to reach capacity. But breakthrough research is using DNA-based data storage, as a low-energy alternative to computer hard drives, with huge capacity: One estimate suggests all the world's data for a year could be stored on a cube of DNA measuring just a square metre.

10. Utility-scale storage of renewable energy

But storing energy generated by renewables for when there is no sun or wind has been a barrier to increased take-up. Lithium-ion batteries are set to dominate storage technology over the coming decade, and continuing advances should result in batteries that can store up to eight hours of energy – long enough to allow solar-generated power to meet peak evening demand.

"Emerging technologies will be key catalysts for the in-demand jobs we expect to see in 2019," said Sarah Stoddard, community expert at job search site Glassdoor. "From artificial intelligence, automation, virtual reality, cryptocurrency and more, demand for jobs in engineering, product, data science, marketing and sales will continue to rise in order to support the innovation happening across the country." More and more often, traditional companies are beginning to resemble tech companies, and this trend will likely continue throughout the next year, Stoddard said. "As employers across diverse industries, from health care to finance to automotive and more, continue to implement various technologies to streamline workflows and boost business, the demand for top-notch workers who have a balance of technical and soft skills will continue to rise."

Here are 10 of the most in-demand tech jobs of 2019, according to recruiters and career site experts.

1. Cybersecurity engineer

Security is a major concern for companies and consumers alike in our connected world, said Marc Cenedella, CEO and founder of executive job search site Ladders.

"Because of this emphasis on organizational safety, we're seeing a huge upswing in the number of security engineer jobs meant to be the first line of defense to safeguard lucrative products and services," Cenedella said.

Internet of Things (IoT) security will become a particular area of focus, as connected devices become staples in daily life and cybercriminals look to exploit them, said Stephen Zafarino, vice president of national recruiting for recruiting agency Mondo. "Companies are definitely looking to figure out how we can protect these new prod that we're putting online and make sure they're not a vulnerability," Zafarino said.

2. AI/machine learning engineer

The explosion in artificial intelligence (AI) and machine learning technologies across the enterprise has led to increased demand for these professionals. "Everyone's trying to figure out ways to optimize their businesses and their practices, and how to automate and make their day-to-day lives a little bit easier, or a little bit more productive and functional," Zafarino said.

3. Full stack developer

Full stack developers are among the most in-demand by employers right now in terms of open job postings, according to data from job search site Indeed.

"Some companies are moving away from siloed back-end and front-end development teams, which requires hiring developers who can work on all levels of the application stack," said Paul Wallenberg, head of technology recruiting services at staffing and recruiting firm LaSalle Network.

4. Data scientist

Named the no. 1 best job in America by Glassdoor for the past three consecutive years, data scientists are expected to remain in high demand in 2019, as nearly every company now has the ability to collect data, and all need employees who can effectively organize and analyze this information.

"Companies are continuing to increase their own proprietary data but are also looking at ways to incorporate third-party data to understand problems impacting their business and having data science competencies internally enables them to do that," Wallenberg said.

5. Python developer

The rise of AI and machine learning technologies has led to increased demand for Python developers in the enterprise, Zafarino said. The fastest-growing programming language, Python is also relatively easy to learn, and has a large developer community.

6. Java developer

Java developers will remain in high demand in 2019, according to data from Indeed and Glassdoor. Despite the growth of programming languages like Python and R, Java continues to dominate the enterprise, with the growth of the cloud keeping it on top.

7. JavaScript developer

JavaScript also remains popular in the enterprise and will continue to in the new year. "Companies that have development teams structured between front-end and back-end teams are hiring technologists whose strengths lie in using various JavaScript libraries and frameworks to deliver more compelling user interfaces," Wallenberg said.

8. Cloud engineer

Job postings that include the terms cloud computing or cloud engineer have gone up 27% since 2015, according to Indeed. "As companies move away from an on-premise infrastructure model to a cloud-first approach when upgrading or designing new environments, the need to hire technologists with cloud experience has increased dramatically," Wallenberg said.

9. Scrum master

Organizations are increasingly turning to Scrum to organize software development, and this method will break out even more in 2019, Cenedella said. "Thousands of companies are hiring so-called scrum masters for the purposes of achieving excellence in self-organization and making changes quickly in their Agile environments," he added.

10. DevOps engineer

As the DevOps workflow grows increasingly popular, more organizations are seeking DevOps engineers, according to Indeed. The number of job postings mentioning DevOps rose from less than 1% in 2012 to more than 24% in 2017, another Indeed report found. These professionals also ranked no. 2 on Glassdoor's 2018 Best Jobs in America list.

Effects of Emerging Technologies on Businesses

Emerging technology is a segment of information technology. It is responsible for designing new products or tools, which are expected to be widely used over the next 5 to 10 years. Companies constantly look to emerging technology for the products or innovative services they deliver that help them develop their company competitive edge. Emerging innovations may require the refinement of technology already used by companies. Technology innovation also allows business to speed up its production process and allow business to improve business operations at a cheaper cost.

Talking more about emerging technologies in businesses, there are two important fields in emerging technology for businesses, Artificial Intelligence, and Robotics. Robotics can be defined as a technological field and part of an engineering science which uses mechanical or electronic technology to replace human labour. Many manufacturing and development companies have incorporated robotics technology into their processes. The robotics development industry is planning to grow into other business sectors. Although Artificial

Intelligence is being used to render robots smart to use in industry. Businesses use the technology of Artificial Intelligence by entering business information into the business machines that help in developing the information and forecast accurate predictions and identify trends for the company (Wood-Harper, Jayaratna, & Wood, 2013).

Emerging Technologies' Effects on Businesses

1. Research and development of any company. This helps businesses develop processes of research and development which are more efficient and less costly. Companies usually adopt some of the technologies, Photonic computing, quantum computing, nanotechnology and biometrics technology. The technologies that the company uses in the research process and break down the information and other processes of business (Evans, 2003). These are the technologies commonly used by the industries dealing in chemicals, medical, petroleum or any other industry. The increased technology of research and development helps a company in developing its products more efficiently and in the low duration of time.

2. The technological advancement in communication. Technology has improved the business communication to a great level, and it can help more to improve (Day, Schoemaker, & Gunther, 2004). There are many new methods of communication that are coming in the line of emerging technology. One of the emerging technologies includes virtual offices. In virtual offices, employees meet and discuss different situations and complete their functions of businesses. Another tool of voice over internet protocol is used for communicating in businesses by audio or video technology equipment. These are the technologies that give freedom to the companies to work with its employees or with other companies across the world (Tsai, 2003).

There are some more issues in emerging technologies that affect the business.

- ### Security, Privacy and Trust Issues

In the race for emerging technology, cloud computing is one the example that is emerging with time, although the technology of cloud computing is beneficial in terms of utilizing low cost by sharing computing and resources of storage, joint together with an on-demand provisioning mechanism that relies on a business model of pay per use. These are the new features that have a direct impact on the process of budgeting of an IT company, but it also affect the mechanism of trust and privacy and traditional security. The mechanisms are not adequate anymore, and they need to be considered for fixation to fit in the new pattern (Bruneo, Distefano, Longo, Puliafito, & Scarpa, 2013).

- ### Resources and Skills

It is also argued that adaptation of emerging technologies in various businesses affects human skills and resources of the company. Emerging technologies in hospitals and other healthcare institutes affect the health care staff and another workforce. The adaptation of machines used for the treatment of cancer and other chronological diseases contains a high volume of radiations which is really harmful. Even though, hospital management implements measures to protect the human resource, but the rays are injurious. Discussing more the impact of emerging

technologies on businesses can be described by the less adaptive behavior of using skills of human capital (Khosrowpour, 2006). The especially business of manufacturing and production have now designed and installed special software and programs into automatic machines, which help machines to operate instead of number of working force labors. Most of the companies have eliminated manual operations that directly impact the unemployment rate in the economy (Nash & Sofer, 1996).

- ## Social and Ethical Issues

Emerging technologies has a major role in businesses as well as on society. The advancement in technologies is making our lives easy but not better. Companies deal with many social and ethical issues by adopting the advanced and modern technologies.

The barriers over distances have shortened as the technology is getting faster and faster; the rate of outsourcing the employees from different countries is increasing as well. The security of the job is affecting the employees and business as well. Employees leave their current office as soon as they are offered a new place to work. And not just workers, companies in every other country in the world outsource their company set-up too. Some other community of businesses operating in the completely different country control their database operating customer services (Loftus, 1997). It may be effective for one company to outsource from another country, but at the same time it creates an ethical gap for the unemployed people of the country same country.

- ## Losing Integrity

From the security point of view, an advanced technology of installing Radio frequency identification technology into the inventories to keep record at first, some businesses are now practicing implantation of this technology in humans to make the security tighter. By doing this, companies are now losing integrity from the employees' side as they do not trust humans and have more trust on computer chips (Yee, 2012).

EXERCISE 1

A student is to create a simple Java program about student enrolment that will classify regular and irregular students. The student type is either 'R' for regular and 'I' for Irregular. What could be the name of the method besides the main() method in the program?

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EXERCISE 2

Your school would like to create simple registration system to help students enrolled in the college. Create a method that will identify the type of the student, and print within the method "regular" and "irregular".

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Courses

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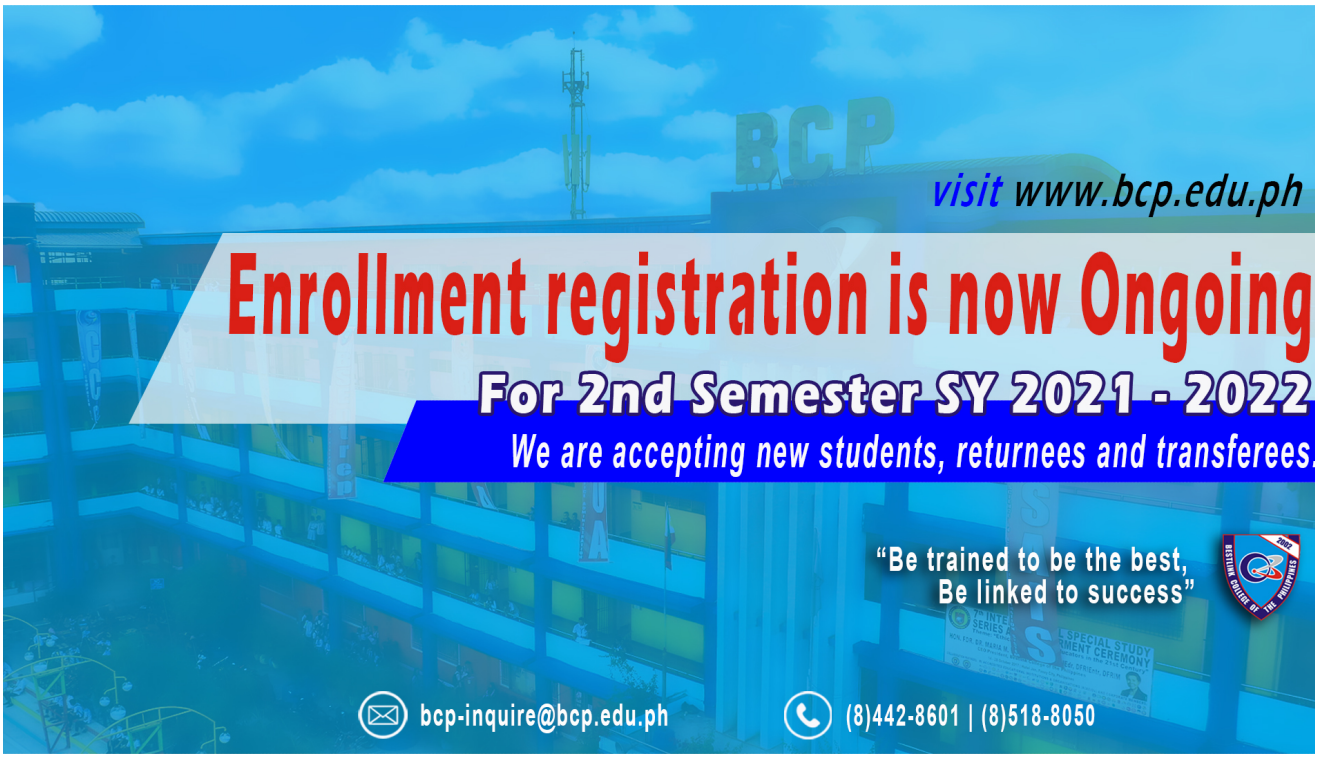
2nd Semester Enrollment



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