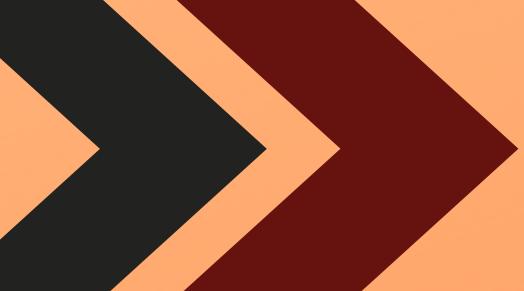


DECEMBER 2020

CARMA

THE CAREER MAGAZINE





KEYNOTE



When I fed the phrase "Intelligence and communication" into Google Search, the first result was a Quora link with the question, "Is intelligence related to the ability to communicate?" There could not be a more appropriate question to ask!

In fact, that is how the first test of intelligence was designed by Alan Turing, who said that an algorithm could be considered to be intelligent if it could generate human-life responses while communicating with a human judge. Hope you all have seen the amazing movie called "Imitation Game". If not, do so ASAP!

The most fundamental difference between living and non-living beings is in the way they communicate. And that's also what separates humans from all other living organisms. But what exactly constitutes intelligent communication? Is it the ability to throw jargon? Is it the ability to give great speeches? Is it the ability to impress others with our rhetoric and debating skills? Is it the ability to use language to subjugate or manipulate others? Actually, none of these! As Peter Drucker once said, "The most important thing in communication is to hear what isn't being said." And it is this ability that will always keep humans with intelligent communication skills ahead of robots. The future of the rest is actually quite uncertain!

- Dr. Kushal Shah

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THE REPRESENTATION GAME

This article sheds light on the tools transcending academia that we require to navigate the disquiet at the inception of careers and corporate interviews.

MAD WORLD

Despite the broad outlook that our mind flaunts, the sapient mind remains susceptible to the "pretense" of the façade. The complex neural networks of the mind, that help us perform complex tasks, e.g., Communication through language, the framework of which have been inherited by us from our ape

ancestors. In its struggle to survive the vagaries of nature, an ape is always making one decision after another; executive decisions. It does so with the simplest tools that it has, the sensory tools. And the image that the ape carries of an event or a person, is dictated by the sensory perception of that event. This memory guides it in making decisions in the future. This is not appreciated enough. Through our education system, we are taught the tools of communication, but deprived of its essence, the why of it. We live in an age where there's a quicksand of anxiety surrounding simple things such as interviews and confrontations, so ironic indeed.



“Welcome to the jungle..”, shouts out Axel Rose. This is the concrete jungle. The player is a modern human, but the mission is still survival. Survival, predominantly, not against death, but in the sociological domain. Some shrewd logistics and inventions have led to a world where the modern human doesn't need to search for means of life, but for reasons to get by it! “Most fail to realize this human-centric nature of the game. Efficient ways of getting our point across, i.e., language. It's one of the peculiarities that set us apart. It makes us human.”

SOMEWHERE I BELONG...

The world rides a wave of intellectualism. Information and substance take priority over everything else. Therefore, most of our upbringing and education is information oriented.

Addressing a more pragmatic concern, how do we get ahead? Get ahead in what? In almost everything that concerns survival in the concrete jungle.

A high number of google searches involve issues from cracking an interview to closing a business deal, everything that concerns communication, in one form or the next. Sadly, people seek quick fixes, all the while beating around the bush. True, however, that it depends on your upbringing, education, etc. But it can be learned. The key is to pay attention and just observe. You know where you stand when it comes to communicating, on the inside. And you also know the people you admire for the skills that they have, not only the greats but also the people around you. Now what I talk about is prudent and meditative observation, not ignorant mimicry. Once you observe, you will realize that we have a stark similarity to our perceptive ape ancestors mentioned before. We rely on simple sensory gestures, such as eye contact, body language.

"Put simply, body language is the unspoken element of communication that we use to reveal our true feelings and emotions. Our gestures, facial expressions, and posture, for instance."

When we can "read" these signs, we can use them to our advantage. For example, it can help us understand the complete

message of what someone is trying to say to us and enhance our awareness of people's reactions to what we say and do. You must've heard about the show called "Whose line is it anyway..?". Yeah, the show where a bunch of goofy improv artists embarrass themselves on cue. Although that show is disheveled and a consistent cringefest, I don't recall when I didn't laugh till my stomach ache! There's a lot one can learn from these artists and take this wisdom to something like job interviews.

Knowing your audience is one such thing. Let your interviewer's behaviour rub off on you. It's a subtle thing, but a little goes a long way to leave the impression that you already fit in. After all, we're wired to trust people who behave like us, psych 101."

One of the things that improv artists do to hone their spontaneity is to frequently utter "If that, then what ?" in their minds. This helps in building off the previous line and knitting an intriguing narrative. When it comes to interviews, this question might help in asking excellent questions, given the liberty to do so.



For example, suppose your interviewer says, "We never deliver a product unless the whole team is 100% happy with it." If you ask yourself, "If that, then what?" you might say something like, "Interesting! Does that ever cause any tension with strict timelines? How would you say the company balances input from the entire team with delivering a final product on time and budget?"

Now, there's plenty of content out there pointing out the common idiosyncrasies and tips and procedures demonstrating the same. But one thing is true, the uncanny hilarity of improv bears witness to the fact that nothing beats observation of self and others. Once that happens, you'll connect the dots yourself.

SHOW ME WHAT YOU GOT!

In *Be, Your Own Brand*, first published in 1999, marketers David McNally and Karl Speak wrote: "Your brand is a perception or emotion, maintained by somebody other than you, that describes the total experience of having a relationship with you." *The Rich Dad Poor Dad*, *Think and grow rich*, etc. are

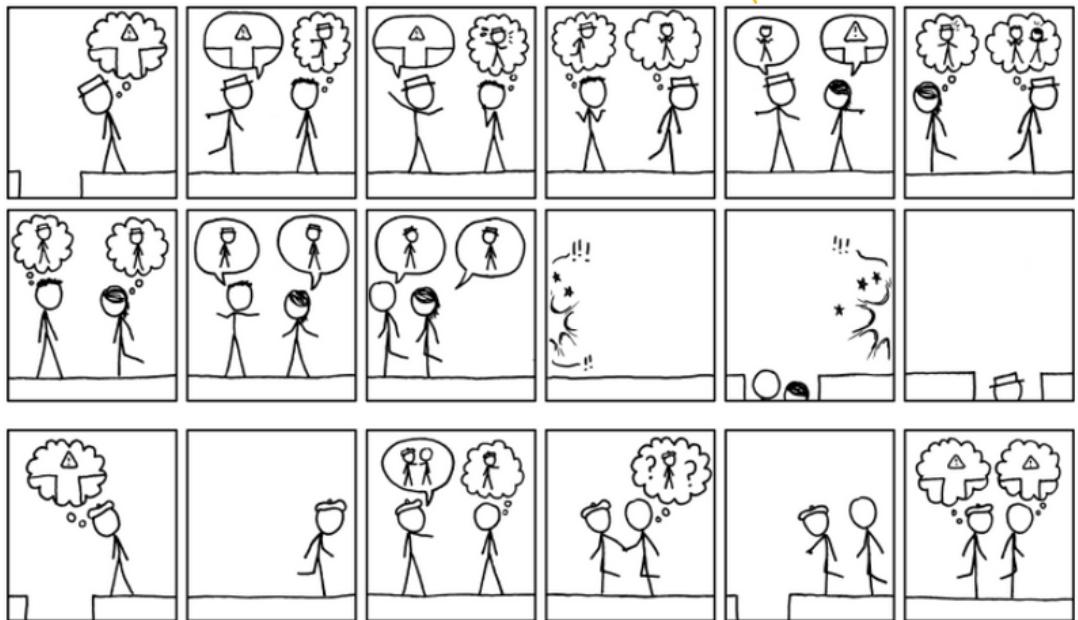
based upon their observations, which they propagated to others. They revolve around the notion of personal branding. An example being, employers increasingly using social media tools to vet applicants before offering them interviews. Practices include searching for an applicant's history on sites such as Facebook and Twitter and conducting background checks using search engines and other tools.[This leads to the decline of resume only job applications, in favour of presenting different forms of personal branding. These may include links to a professional profile (such as LinkedIn), a personal blog, a portfolio of industry-related articles, and evidence of an online following. These efforts may improve a person's chances of obtaining a job.

The way that I perceive the idea of me is represented by how I present myself. Don't go insane about every move. It's the subtlety with which one deals with situations differently and efficiently, e.g., facing criticism and embarrassment—being mindful when these icky situations arise. Sometimes, people go the extra mile and learn the vernacular of the residing area, because guess what schisms and favoritism are very common. All in all, this should not come at the cost of your true identity; it's more like another feather in your cap.

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All comics
Courtesy-
xkcd.com



NOTE FROM AUTHOR -MANAS

“Needless to say, it isn’t ideal to take career advice from a sophomore ! But it’s important to discuss the insecurities that exist amongst the youth. It’s easy to lose our minds to the juvenoia, confusion and the existential (and literal) crisis we’re in. The preservation of self-worth, knowing the basics and simplification is the essence of what my article tries to convey. After all, not all who wander are lost ;)



MOLECULAR DIAGNOSTICS



AN INTERVIEW WITH DR. NICKHIL JAKATDAR, CEO OF GENEPATH DX, AN R&D FACILITY AND MOLECULAR DIAGNOSTICS LAB IN PUNE, MAHARASHTRA AND ANN ARBOR, MICHIGAN.



Dr. Jakatdar has a track record of successfully bringing technology products and services, across consumer mobile video, molecular diagnostics for healthcare, computer-aided design and semiconductor design-for-manufacturing software, to market. Before joining GenePath as CEO, he was instrumental in the founding and leadership of Vuclip, Praesagus, and Timbre Technologies, leading them all to successful acquisitions and creating more than \$1.2B in value for his stakeholders across these companies.

He has also been an investor and advisor to more than 40 startups over the years. He has received numerous awards, including the IEEE Best Paper Award, the UC Berkeley Innovator Award and the College of EngineeringPune's Lifetime Achievement Award, amongst others and is one of the founding members of the Bhaulnstitute of Innovation, Entrepreneurship and Leadership. Dr. Jakatdar has 60 patents to his credit and more than 20 journal and conference papers. He holds an M.S. and Ph.D. from UC Berkeley in Electrical Engineering and Computer Science.

Q1] GenePath dx is known worldwide for developing high quality, affordable testing kits and assays for various infectious and genetic diseases as well as for cancer. Can you briefly talk about the process that is involved in developing these kits and assays?

We at Genepath run both a **clinical lab**, where we get patient samples, as well as an **R&D facility** that creates test kits. In that sense, we're unique because most companies do one or the other. Our focus is entirely on Molecular Diagnostic Tests, so we're not doing standard pathology lab tests. We're very specialised.

The advantage of doing both, from a development process point of view, is that you get to be your customer. A lab like ours would be the customer for the kits we're developing. So we would want to place a very high standard for what we would accept as a lab, which eventually becomes the requirements for the kit development process. That ends up being a fascinating process because we're not using somebody else as guinea pigs, we are our guinea pigs!

Let's say we start on a new test that we have never built before, but because we're a lab we want to offer that test to a consumer or patient. We will use an off-the-shelf test kit. We'll provide the diagnostic test for a patient and as we do hundreds of them, we will learn a lot about the types of variations in the patient samples. We will then analyze the performance of the test kit that we used, what its drawbacks are, and how we can improve it. We will also look at its cost, its accessibility and its accuracy. This helps set the requirements for the kit as well as gives us an idea of the volume of business we can get. Given the quality of the team that is in place, which is a very cross-disciplinary mix of medical doctors, geneticists, computer scientists, engineers, all working together, we have almost always managed to meet or beat the goals we set for ourselves. We build the kit, do head to head comparisons with the best commercial test kits, and when we're convinced that we have a better product, we apply to the regulatory bodies and get it approved. We use it in our labs first, and then we sell it to the others.

We also hear that your samples are from all across the globe.

We have always aimed to be the best in the world. And we've come to learn that the only way to achieve this is by collaborating with the best. Over many years, we have identified various individuals - scientists & professors - who are absolutely at the top of their game in this space, and wherever we found that we shared similar values and philosophies, we collaborated with them. We engage in intellectually honest conversations so we get to the crux of what works and what doesn't and then accordingly we can try to resolve the issues without involving unhealthy egos. Only once we get validation of our work from the best, can we make a claim that our test kit or test is amongst the best in the world.

Q2) GenePath dx has developed CoViDx One, a Covid-19 RT-PCR (Reverse Transcription-Polymerase Chain Reaction) test kit and is the first organisation in India to run a NABL/ICMR approved Covid-19 testing lab, What is the company's roadmap for the future in this pandemic? Do you also advise the general public and local bodies on particular protocols and safety measures?

We're the first company in India to have both an NABL & ICMR certified lab as well as an ICMR certified test kit. Our mission, before CoViD even hit, has always been to create affordable, accessible, and innovative tests so that everybody has access to this healthcare. In the US & even India, healthcare is still out of the reach of low resource communities. Either it's an issue of affordability or accessibility.

If you look at molecular diagnostics, it's considered very bleeding edge science. In India, not many people were running molecular diagnostic tests, but CoViD has changed that. At one point in recent history, many medical professionals didn't even know what a PCR machine did. So, on the one hand, we're talking about advanced tests, but on the other hand, we want to make them affordable and accessible to the layman. Trying to bridge these two worlds has been our mission right from the beginning, and we had been doing it for other diseases like Spinal Muscular Atrophy, Dengue, Chikungunya, etc. When CoViD hit, we found that the need for accessibility and affordability is still there. But now the entire country's attention is focused on this. Now even people on the street are talking about PCR and Ct (Cycle Threshold) values. While awareness going up is important, we still need to make it affordable. When the Health Ministry first launched the CoViD tests, the Government had mandated that it shouldn't be more than ₹4500, which was still very expensive for many people.

With the public, we spend a lot of time doing various interviews and articles to increase the level of awareness and education. We see that WhatsApp messages keep floating around, which most of the time confuse people through misinformation (no malintent but still dangerous) and disinformation (intent to mislead making it even more deadly); it leads to them making the wrong decisions. We have started doing sessions which are more educational and informative where we explain the different types of CoViD tests, like the antigen test, the antibody test and the RT-PCR test. We have found that most people appreciate it when we educate them in a simple to understand manner without using buzzwords. We also started Pune's first ever drive-up facility, where people can come in their vehicles and get tested, without having to enter the lab or clinic. We also use that facility as an education space where we use posters to address frequently asked questions.

GenePath announced in early October, what was probably the cheapest test in India when we dropped our price to ₹1500 and we have continued to innovate so as to bring down the price to ₹1000. We will soon bring the price down so low that people should not think twice before getting the test done. That has been our mission right since the beginning, and it continues to drive our roadmap for the future.

For regulatory bodies, each of them have their own views but over time we have managed to establish ourselves as a high integrity and a highly credible organisation. Because of that, we find that some of them take the time and effort to call us and ask for our opinion on certain issues they face. For example, how to reduce the friction points in testing, how to minimise panic and get rid of the stigma people have regarding testing, etc. are the types of discussions we regularly engage in.

Q3) Having read your profile, we see that you have such a brilliant academic and professional journey. From founding Timbre Technologies and Vuclip Inc. to becoming the CEO of GenePath, what advice would you give young and aspiring science entrepreneurs?

1) **Look for the problem.** It is easy for people with a science background to fall in love with a solution, but if you want to be an entrepreneur, then the critical thing is to find a problem that customers are facing and that is making their life difficult. You must understand the situation from their point of view. As a science entrepreneur, it is necessary to find a solution that solves that problem rather than finding a solution in search of a problem. Fall in love with creating value rather than the solution.

2) **Learn to embrace failure.** Most people in the science space are there because they've done well in school and hence are pursuing a degree in science and engineering. One of the challenges that comes with it is that most of us are afraid of failure. So it's natural to take the safe path and you will be reasonably successful; it's not a bad strategy. But if you want to be an entrepreneur, you're supposed to be doing something that nobody else has done before, which means you have to try new things, and when you do that, there's a high chance you'll fail often.

But, you should embrace failure. It is a stamp that you're doing something right. If you're not failing enough, it means you're not setting a high enough goal. Of course, that is easier said than done, but when it works, it gives you great pride and satisfaction because you have solved a problem that not too many people have tried to solve or have given up on.

3) **Communicate better.** I have noticed that people with a science or engineering background tend to under-appreciate the importance of communication. You may think that if you solve the problem correctly, it doesn't matter what you say or how you say it. But the reality is that if you want to be an entrepreneur and want to do excellent work, you are going to have to inspire a lot of people. They could be customers, investors, employees, or partners. They need to buy into your vision. Which means, not only should you do great work, you should also be able to communicate in a way that is inspiring. The power of written and spoken communication is essential.

4) Surround yourself with people who are smarter than you. You should be okay with being questioned. It is important to be comfortable with accepting that others may have ideas better than yours. When you do this, you attract capable and smart people, and that's when the magic happens.

Q4) You have a fascinating and informative blog; what made you start this blog, and how do you make time for it in your busy schedule?

There's a saying: you learn best by teaching. For me, this is a new space. I was into semiconductor manufacturing and then into consumer mobile video, and now this is molecular diagnostics. I have had to learn so much before I could have a meaningful conversation with someone in this space. So I took many courses and learned a lot of new things. But to know if I had grasped the concepts well enough, I started writing these blogs. I would capture all my thoughts in the articles and then send them to people who are experts in this space and ask for their critical feedback. It also served as an educational tool for others. I thought that if I could benefit from it, so could others. In my previous company, I wrote a blog article every week, for 324 consecutive weeks. It was on topics that varied widely. It was not an external blog; it was for the six hundred people in the company, but it was an excellent communication tool. It helped me keep the entire team, spread across 24 countries, on the same page.

I would talk about things like our revenue, some new scientific discovery, an opinion of a well-known personality I had recently met, or something new I had learnt about my health.

Every fourth week I would invite an employee to be a guest author. And in that way, over 324 weeks,

I got 80 employees to talk about their observations and their issues. It became a fantastic bonding exercise.

If someone were to tell me ten years back, that one day I'd be writing blogs, I wouldn't believe them. I used to find writing very painful and tedious, but today I enjoy it because I see the value it brings me personally (and hopefully to others as well). Similarly, at GenePath, we are already at blog #60 that also cuts across a lot of different topics. I have made a few of them public if I felt like people outside the company would benefit from it as well. Link to the blog: [Here](#)

Q5) What challenges does your company face? And how do you overcome them?

Most startups face similar challenges: while some may be unique, most are very common. We're a small company, and we work against much bigger competitors who have a lot more resources than us. So how do we differentiate? If we did what they're doing, there's no reason for people to buy from us. Because the general rule of thumb is that if an established company and a startup offer a similar product, then the established company can have a product that is 20 percent worse than the startup's, and people will buy from them. So we have to try to be much better for people to buy from us.

That's challenge number one: how to keep getting better through innovation. Number two is always keeping a step ahead.

We can declare victory today because we have something better, but tomorrow, when the others catch up, we're back to the drawing board starting from scratch.

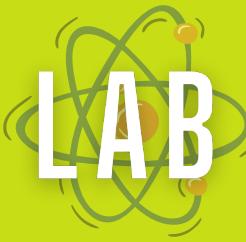
Another problem we face is trying to recruit people to join us. There's always more risk in joining a startup. We need to create a culture which attracts people to our company. We can't pay more than most of the more well-known companies, so we have to differentiate in other areas. And then, of course, the one thing that every small company has to deal with is how to become self sustaining.

While we need to convince investors to invest in us through demonstrating a unique product and a great team, but then that will last for a short time. At some point, we have to show that we can thrive without external funding. A unique situation we're facing (and so are others doing CoViD related work) is that we're suddenly under the scanner. At no other given point in time in history has the entire world's attention been focused on just one thing. Not 50, not 50 million, but 5 billion people care about the kind of work we're doing. So right now it's a lot of pressure of expectations but when the going gets tough, the tough get going. We are excited to be doing meaningful work that can truly affect the world!

NOTE FROM AUTHOR – SAKSHI

I first heard about Dr. Jakatdar through a family member during a casual dinner table conversation. I listened in rapt attention, as the words 'molecular diagnostics' and "startup" continually came up. When I met Dr. Jakatdar for the interview (over Zoom of course), his punctuality, humility and friendliness were clear indications of his deep commitment to his work and his pleasant demeanor in his workspace. His journey and the cutting edge research done by his company, GenePath dx, will inspire every scientist and entrepreneur in the making.

FROM THE LAB TO THE MIND



What makes a scientific discovery reach the masses?

This article talks about such a bridge without which any scientific discovery would only have a meagre impact on the world. Communication plays an integral role in conveying relevant information to the targeted audience and thus expanding its scope. The dynamic of a giver and a receiver of information is what most people forget about while communicating. While communicating, it is essential to put ourselves in the shoes of the listener and make sure that the information being received by them is “comprehensible”. Both the giver and the listener should be on the same plane of thought and understanding. Only then is “communication” effective.

What makes Scientific Communication different from Science Communication?

Interestingly, it is the target audience that significantly differentiates 'Science Communication' from 'Scientific Communication'. Science communication or SciComm is intended for the general public, where one does not necessarily need a specific academic qualification to communicate. Anything from public lectures to writing science blogs comes under SciComm.

Scientific Communication, on the contrary, is a formal way of communication within the scientific community. It primarily includes publishing research papers in journals and giving oral presentations at conferences.

How does one inculcate ways of good science communication?

For science communication to be effective, the content must be palatable to the receiver. How does one do it? One may ask. Let us consider an example. Most of us have seen unboxing videos on YouTube. In each video, we see that the product is packaged beautifully. The packaging really doesn't serve much purpose as it is later discarded, and yet most companies pay attention to their packaging and design in great detail. It is really just a waste of paint and resources, and yet Multinational Companies do it! Why? Because something as trivial as the colour of a phone's back cover happens to be very important in the market, as it helps the product sell! To be good at Science communication, one has to do something particularly similar.





Package your research work in such a way such that your audience is attracted to it; just like are insects to light.

And this is exactly where art comes in. You need various forms of "Art" to make "Science" palatable and to make it sell in the fields of "Commerce". The arts can include fine arts, writing, speeches, debates and absolutely anything you like! As an example, we have a famous Indian Astrophysicist, Jayant Narlikar, who has written 35 books, around half of which are works of Science Fiction. Here are some tips for effective Science Communication by Prof. Ananthanarayan from IISc, which he gave in his talk in IISc's science fest, Pravega.

One must try to diversify their way of communication to reach a variety of audience.

1. One must be honest, concise and to the point. Packing too much information in a segment is always a bad idea.
2. One must never hide any details or neglect any assumptions in their writing.
3. One must cite their sources correctly and always have a humble acknowledgement.

What makes Sci Comm and Scientific Communication so important?

The significance of good scientific communication skills for a person working within the scientific community is indeed well pronounced. These skills ensure better collaboration among people working in different fields and provide new opportunities for innovation; which makes research much more effective, inclusive and accessible.

A research paper is probably one of the most boring and difficult to understand documents for a common man. Science communication enables every person to perceive the knowledge etched in the letters of that paper. It expands the frontiers of science beyond a specific group of scholars, to make it comprehensible to the general public. As science progresses and grows more complex, it is very common for someone from a "non-scientific background" to feel disconnected. They might not feel the need to learn more about the latest topics of research because they think it doesn't affect their daily life in any way. This "disconnect" between the household and the Laboratory is detrimental to both sides. Without support from the household (i.e. demand from the common man), the laboratory (supply from scientists) cannot be sustained. Scientists depend on patents and funds from companies, which can only be procured if the common man is interested in their research. And this interest has started to depreciate over the years due to the disconnect.

Hence Science communication deals with bridging this gap between the Laboratory and the Household.

Sci Comm helps to relay scientifically sound information to the people in a way that strengthens the relevance and interest of a particular field in society.

The wisdom that cannot flow from one mind to another is ultimately useless. Thus, with better communication, science thrives.

Why should scientists be good communicators?

For any person developing a specific idea, it must be conveyed well to reach the desired outcome. Similarly, scientists need to communicate better to make their work have the best possible impact. A researcher significantly involved in Sci comm via various outreach activities can influence society better through his work.

HC Verma, a renowned physics professor and author, once articulated in an interview that his motivation for writing his iconic books was that he wanted to bring Physics being taught in the universities of Europe and the United States and make it relatable to the children of India.

Neil DeGrasse Tyson and Carl Sagan are more known for their TV series "cosmos" than their actual research work.

Communication skills have become so important in the past few years that now it is no longer a soft skill. Instead, it has now become a core professional skill. Hence aspiring scientists need to inculcate these skills early on in life.

Can one choose Scientific Communication /Science Communication as a career option?

Science Communication is a fairly contemporary field and hence is booming with new opportunities day by day. Many companies, such as GSK pharma, Pfizer and ACS, are willing to hire more and more people for scientific writing. Some companies are willing to give up to INR 9,50,000 per annum for Scientific writers. Science communication also includes giving talks and hosting seminars which amass a lot of money compared to a stipend. As you can see, Science communication is a great field to tread into. Scientists all around the world are trying their best to bring their work to the common people. Science fiction movies, series such as The Big Bang Theory and documentaries are all examples of great initiatives taken by researchers to deliver their research into people's houses. There are innumerable media such as Science galleries, podcasts (such as Mindscape) and Science magazines such as our very own Chrysalis that bring out the essence of science in an engaging and fun way.

NOTE FROM AUTHORS

-Kaushal & Riya



Any knowledge is incomplete without communication, a wise person once said (that is if you consider both of us wise people :P). While it may not be one's cup of tea at first, we believe that communication is a skill that can be honed with determined efforts. So go ahead, give it a shot!



AI FOR ALL!

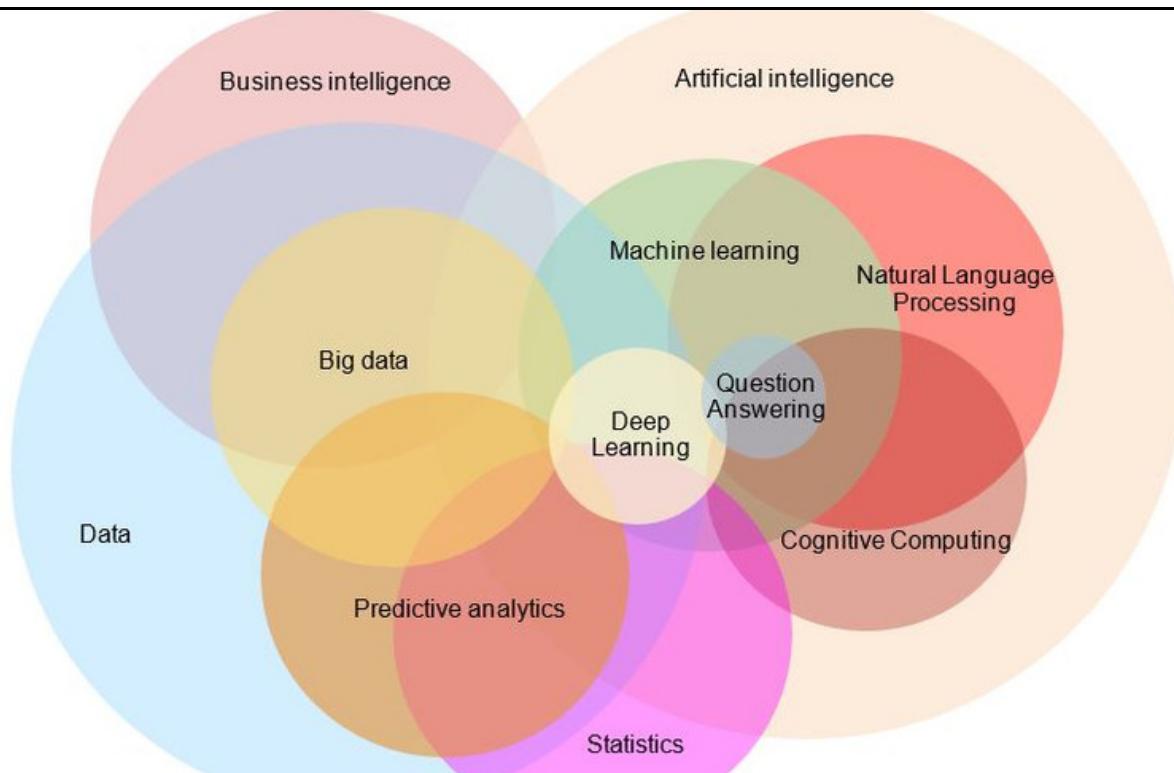


Implications of AI on people & society

What is Artificial Intelligence?

The [Encyclopedia Britannica](#) defines AI as “the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.” Intelligent beings can adapt to changing circumstances & learn from experience. AI is already changing our daily lives, almost entirely by improving human health, safety, and productivity. AI is being used in areas ranging from material science to medical research & climate science. In various disciplines, these technological Applications could help tackle moonshot societal challenges. This makes it significant to pursue research in allied fields with an ethical mindset!

The following article elucidates upon the diverse Implications AI will have on...



I. AUTOMATION-

Automation's very goal is to assist humans with mundane /& challenging tasks; the user makes the final decision, and Human supervision is vital here.

A. HEALTHCARE-

The healthcare industry is ripe for some significant changes. AI offers several advantages over traditional analytics and clinical decision-making techniques.

Learning algorithms can become more precise and accurate as they interact with training data, allowing humans to gain unprecedented insights into diagnostics, care processes, treatment variability, and patient outcomes. Smart devices have already started to provide clinically viable healthcare tools by keeping tabs on an individual's health condition (IoT & Predictive Analytics). This enables finer-grained, more personalized diagnosis & treatment.

The data generated enables researchers to gather new insights & identify trends in Parkinson's, Alzheimer's & many other disorders. One model facilitating this works on handwriting & speech analysis, a relatively noninvasive source of information, monitors peoples' cognitive health, compared with brain scans and other laboratory tests. With Blockchain & Geospatial Analysis at play, it armors us efficiently against SaRS COVID-19 too!

A significant challenge here is to optimally integrate human dimensions of care with automated reasoning processes

Many algorithms can do things better than humans. However, we always trust our intuitions, our mind, more than something we don't understand. We need to give doctors reasons to trust AI.

- Regina Barzilay, Professor, MIT(CSAIL)

Source: MIT Technology Review

B. FINANCE-

It is natural for AI to succeed in Finance because it's based upon gaining insights from past data. AI & ML provide unique value in Risk Assessment owing to their much higher speeds of going over vast amounts of data, efficiency & precision

in the calculation. It's also setting up new paradigms such as Banking As a Service, an end-to-end process ensuring the overall execution of a financial service provided over the web. Geospatial Analysis and ML techniques also enable real-time fraud detection, ensuring security to both banks and customers.

C. EDUCATION-

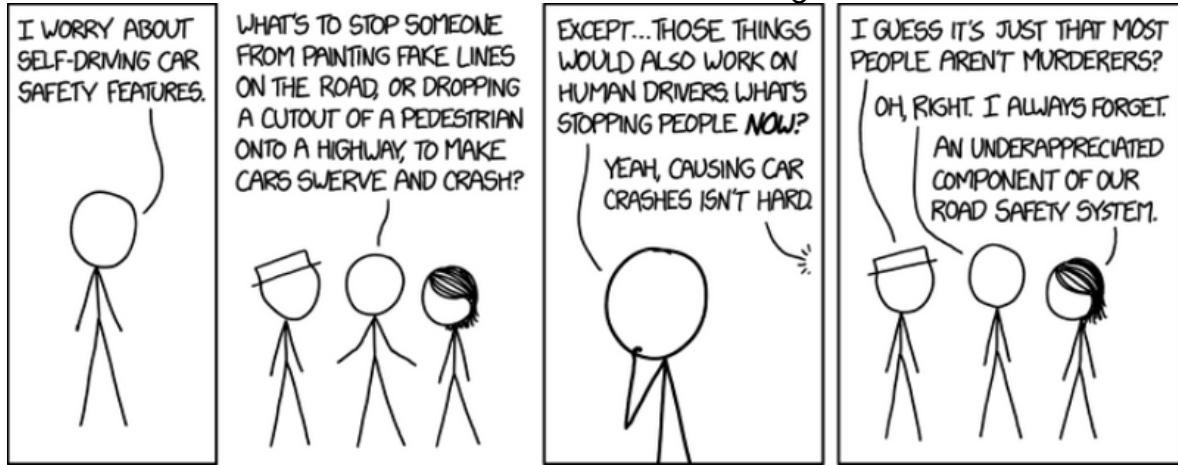
For AI to truly succeed, Educating the public about its prospects, goals & techniques is of foremost importance. With the recent breakthroughs in AI, it has become a hot topic, and many "data science enthusiasts" have emerged. This being established, AI also affects Teaching Methods. With the advent of the Internet, e-learning ushered in possibilities for long-distance learning in any discipline. AI now makes it more convenient to study for low-resource communities who did not have much access to schools earlier. It also helps curate smart, customizable, and personalized content for the curriculum or students with Additional learning needs. AI has great potential in automating and expediting administrative tasks for both organizations and professors. It proves to be useful in Evaluating assignments, where educators spend their maximum time. Automation of these tasks leaves more room for one-on-one clarification sessions. Needless to say, the technology is prone to error and thus requires instructors' supervision.

D.RESEARCH VENTURES-

With more extensive data comes faster & more efficient experimental research.



Scientists see this as a huge opportunity to imbibe scientific principles with enhanced scope for informed opinions in the general census and perform more efficient experiments. It also enables them to do real-time analysis of the data collected. Nevertheless, there's a catch here—With the pre-existing, nascent techniques, Datasets can be manipulated to yield a preferred result of the study. To curb the adverse impact this might have, scientists, are improving data analytics technologies to select more reliable data.



F.TRANSPORTATION-

AI applications can transform transportation on a day-to-day basis with self-driving vehicles, on-time pick-up of people, and packages delivery. This alone will reconfigure the urban landscape, as traffic jams and parking challenges become obsolete. Current cars can park themselves, perform adaptive cruise control on highways, steer themselves during stop-and-go traffic, and alert drivers about objects in blind spots during lane changes.

E.AGRICULTURE & DISASTER MANAGEMENT-

Although Agriculture plays a significant role in the economic sector, there was less digital intervention. But Now, Artificial Intelligence is revolutionizing agriculture by helping determine the crop yield, irrigation, soil content sensing, crop monitoring, weeding, crop establishment, weather forecasting, etc. This optimization is achieved using various analysis techniques like Computer vision, Big Data Modelling, etc. with surveillance data from autonomous UAVs* /drones. All these efforts will result in bountiful yields.

As the name suggests, Computer vision is the computer's ability to perceive the world as any human eye would. It helps deal better with adversity in disaster-prone areas by making early predictions with deep learning. With such severe matters of lives involved, precision is a must-have.

Nonetheless, It is tough to program cars to act in situations where human injury or death is inevitable, especially when there are made about whom to put at risk.

II.PSYCHOLOGY-

Neuromorphic computing, a less known yet a fundamental domain of AI's applications tries to mimic our brains' biological Neural Networks to improve computing systems' hardware efficiency and robustness. Neuromorphic Computing aims to offer a tool for neuroscience to understand the dynamic processes of learning and development in the brain and apply it to generic cognitive computing. The field is up-and-coming for research and presents scope for a combination of 2 unanticipated yet highly advanced fields—Neuroscience & Computation(AI).

CHALLENGES

Neuralink, an ingenious yet fundamental idea that aims to implant wireless brain-computer interfaces(chips) in the brain to help cure neurological conditions & ultimately fuse humankind with artificial Intelligence. Many experts debate on the method's applicability & repercussions. With automation easing the earlier high effort tasks, many diverse fields become lucrative & more focused career pursuits.

III.Ethics- The measure of success for AI applications is the value they create for human lives. In that light, they should be

The concern for man and his destiny must always be the chief interest of all technical efforts. Never forget it among your diagrams and equations.

-Albert Einstein

designed to enable people to successfully understand AI systems, participate in their use, and build their trust. Public policies should help ease society's adaptation to AI applications, extend their benefits, and mitigate their inevitable errors and failures. A vigorous and informed debate about How to best steer AI in ways that enrich our lives and our society? How AI is deployed, addressing concerns about how privacy is protected, and AI's benefits equitably shared? is the need of the hour.

In many ways, AI is the new Electricity, and very much like it, needs to be used judiciously.

Prominent researchers also say,
"Electricity is the new AI"-Food for thought!

Despite the tremendous impact of AI on everyone's lives, AI also has the potential to be used for nefarious purposes.

"It is not about Technology being an existential threat; It's Technology's ability to bring out the worst in people that is an existential threat."

-Tristan Harris, Centre for Humane Technology

As companies start to see value in investing in AI, they try to maximize their

Databases' potential and appeal to broader consumers' sets. With the digital revolution, most of the information traditionally collected is translated into a format that a computer can record, store, search, and analyze, i.e., Structured Data. Now there is a proliferation of unstructured data collected from digital interactions- emails, social media, smartphones, GPS tracking that went unnoticed earlier. The amount of data and the various sources that can record and transmit data has exploded. Recommendation Engines also use one's location to analyze what interests you by the demographic. Many Ethical AI practitioners are concerned about the impact of such widespread data collection and the mode of its utilization on privacy. As artificial intelligence evolves, it magnifies the ability to use personal data in ways that can intrude on privacy interests by raising the analysis of personal information to higher levels of power and speed.



Moreover, algorithms are decision-makers herein, while users are unaware of their potential impact on their daily personal lives & interactions. Social media uses a wide variety of such decision-making algorithms. It is driven monetarily by advertisements, and hence algorithms are formulated such that users spend lots of time with little self-realization.

- *The algorithm is designed to find a few rabbit holes that are very powerful and closest to one's interest.*

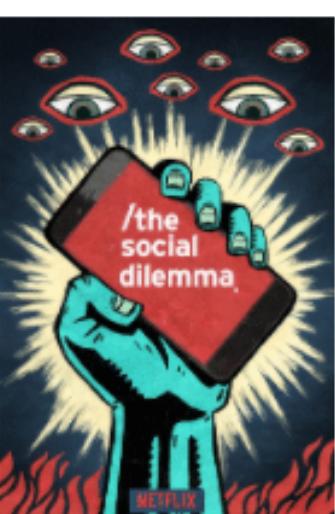
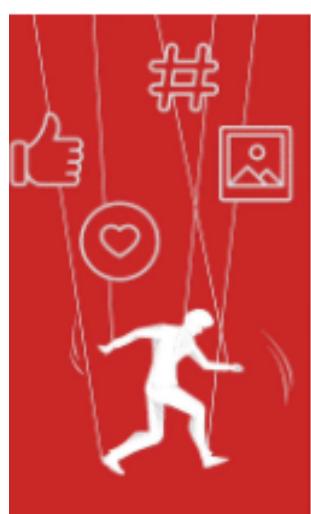
-Guillaume chaslot, Intuitive AI, ex-Youtube engineer

- *Fake News on Twitter spreads six times faster than real news.*

-Tristan Harris, ex-Design Ethicist at Google

Source: *The Social Dilemma*, Netflix Documentary

Social media intended to unite the world & in many ways, it has succeeded, But it has also split people apart by bringing about political polarization. People become vulnerable to believe in various ideologies by personalized information rabbit holes dug out by the same algorithms. Conspiracy theories' believers have become more widespread;



Cults consisting of 'Climate change is a hoax' believers & 'anti-vaxxers' have formed.

This instills Biased perspectives that quickly become deep-rooted, even in the most rational minds. However, wrong/right these ideologies might be, they are eventually vulnerable to exploitation that, in turn, may incite violence and disputes amongst conflicting groups. This influence provided by social media continues to be used in malicious ways in the wrong hands.

DEEPFAKES:

Deep Fakes are artificially synthesized(fake) videos or audios that usually look real.



Though fake photos have long been plentiful, faking videos has been more difficult, and the presence of deepfakes increases the difficulty of classifying videos as genuine or not. Detecting deepfakes is a challenging problem. As of yet, many researchers have been developing tools that can detect deepfakes with greater than 90 percent accuracy.

*We are witnessing an arms race between digital manipulations and the ability to detect those, and the advancements of AI-based algorithms are catalyzing both sides'-
Hao Li, University of Southern California*

The technology behind its creation, Generative adversarial networks, learns to generate new data with the same statistics as the training set. They are also used to create artificial medical images for testing purposes- Generating MRI Images of Brain Tumors, improving astronomical images, simulates gravitational lensing for dark matter research.

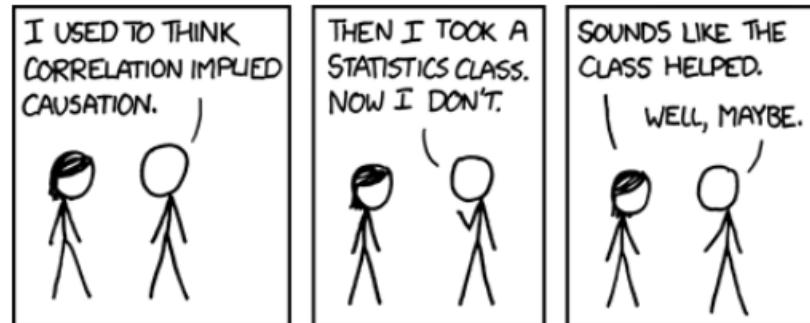
The present system architecture of deep & Reinforcement learning works by deriving correlation from training datasets.

Robots are trained in simulation, and when you try to deploy in the real world...they usually fail to transfer their learned skills.

- Ossama Ahmed, a master's student

at ETH Zurich

source-IEEE Spectrum



Causality is fundamental for the next steps of the progress of machine learning

Yoshua Bengio, a Turing Award-winning scientist

MYTHS DEBUNKED:

i. AI will displace humans and make contact center jobs obsolete.

THE ROBOT APOCALYPSE IS NOT YET HERE

A McKinsey study found out that about half of the activities (not jobs) carried out by workers could be automated. & Nearly all professions will be affected, but only about 5% of occupations could be fully automated by currently demonstrated technologies. The study also indicated that AI may displace 10-30% of the global workforce, but automation can create more jobs than it displaces.

"This isn't about what we let AI do to the workforce; it's how we control its use to the good of the workforce."

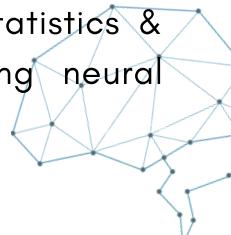
Cathy Bessant, COO & CTO, Bank of America

Source: WIRED

By offering entrepreneurs new tools, It also enables creating previously unimaginable-business lines & paradigms for the industry. Rather than replacing workers, AI can be a tool to help employees work better.

Most careers in artificial intelligence require coursework and experience in a variety of math and science-related topics like:

- Computer Science: Coding expertise with popular programming languages such as Python, Java, Julia, etc.
- Science: Engineering, Robotics, cognitive learning theory, language processing.
- Mathematics: Algebra, calculus, logic and algorithms, probability, statistics & Bayesian networking (including neural nets)



ii.“Cognitive AI” technologies can understand and solve new problems the way the human brain can.

This comparison is inevitable, albeit the misconception is prevalent because we view intelligence as a single dimension, whereas it is multidimensional in nature. To date, human intelligence has no match in the biological and artificial worlds for sheer versatility, with the ability to reason, achieve goals, understand and generate language, perceive and respond to sensory inputs, synthesize and summarize information, and create art and music, and even write histories.

Given its complexity and efficiency, it would be safe to assume that it's highly unlikely to completely mimic the human brain in the foreseeable future. AI aims to mimic the efficient pro-brain, not to make Frankenstein's monsters that eventually overthrow the Human race. Though there is a vast difference between the two approaches, the lines are subtly blurring now. Simply because of the scale and speed at which research is progressing. Thereby arises the need for an AI regulatory ethics committee that studies the implications new technologies might have.

SOLUTION

Integrating technology and making it open source by leveraging existing data sets to provide valuable services is the first step towards more efficient AI.

from AI to respond to crises while not generating a more fundamental, deeper vacuum of rights.

We're entering a world where AI will be ubiquitous – cheap smartness will be embedded into all we make. But a bigger payoff will come when we start inventing new kinds of intelligence and entirely new ways of thinking. The new ways of thinking don't need to be faster than humans', greater or deeper. In some cases, they will be more straightforward.

Kevin Kelly, Digital Visionary & Founding Executive Editor, WIRED

Source: [TED](#)

As capabilities in these areas and others cross the threshold from laboratory research to economically valuable technologies, a virtuous cum vicious cycle starts to spin. Even small performance improvements are worth large sums of money, prompting more significant investments in research. For a more mature conversation, we need to move from what we want AI to do towards a more in-depth discussion on what we need

Everything that civilization offers is a product of human intelligence; we cannot predict what we might achieve when this intelligence is magnified by the tools AI may provide, but eradicating disease and poverty is not unfathomable. Because of the great potential of AI, it is significant to research how to reap its benefits while avoiding potential pitfalls. The progress in AI research makes it timely to pave the way forward for more egalitarian & utilitarian AI technologies.



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2. [Benefits & Risks of Artificial Intelligence](#)
3. [Start A Career In Artificial Intelligence](#)

FURTHER READING:

1. LIFE 3.0-Max Tegmark
2. Weapons of Math destruction- Cathy O'Neil
3. Artificial Intelligence-A modern approach-Stuart Russell & Peter Norvig
4. Hello world-How to be Human in the Age of the Machine-Hannah Fry
5. Superintelligence-Paths, Dangers & Strategies-Nick Bostrom.
6. Deep Learning: Ian Goodfellow, Yoshua Bengio, Aaron Courville

Also Checkout:

- [Your Undivided Attention Podcast-Tristan Harris & Aza Raskin](#)
- [What can we, as individuals, can do?](#)



NOTE FROM THE AUTHOR - VATSALA

There is a lot more nuance to each domain, For further insight, refer to the mid-text articles.

To err is human! To err-adiate problems is humane!

Adversity builds resilience in humans, I hope AI imbibes this, for all we know it might as well help deal with any future AI winters!

RESEARCH INTERNSHIPS



Gokul Mohanraj:

Gokul Mohanraj studying Electrical Engineering at IIT Madras is a Placement Coordinator of the Placement Core. He is a member of the team holding the record in the Asian book of Records for the maximum number of smartphone-controlled robots cleaning an area and also is a winner of ET Campus Stars 3.0 2020. He has various internship experiences under his belt such as being Data Acquisition Engineer at Raftar Formula Racing and

Deep Learning intern at Pure Scan AI. The focus of this interview though was a Deep Learning Research Internship with the University of Cambridge during the lockdown period.

1. You undertook a Deep Learning Research Internship during the COVID pandemic and obtained promising results. How did you go about the application procedure? How was your journey through this fully virtual internship?

The internship experience was quite different from what you have as an onsite intern.

One of the most significant differences is that when you are an onsite intern, and you are stuck at some point, you can go to your guide the very next day and ask them that. The internship was with the University of Cambridge and was an application of deep learning in biology. It was difficult to ask for advice about the problems faced because there's a vast time difference of 5 hours between India and England, which was a little tricky.

When you are an actual onsite intern, apart from the guide, you also have access to the entire university's resources like accessible labs, and PhD students are approachable for doubts as well.

But in this case, you are pretty much on your own. While pursuing a virtual internship, significant factors are your interest in the field and how much effort you are willing to put in because there's honestly no one to help you. Since the field was deep learning, it is doable as long as you have a laptop with you and a good internet connection. If you have an internship in areas that require onsite resources, it becomes very tough. Another factor is that many people do research internships to connect with the guide, which is not possible with virtual internships.

There are different types of internships like predefined scholarship based internships like MITACS in Canada, which begins around December, for all the universities in Canada. The professor will contact you for a few rounds of interviews if you get selected. Similarly, DAAD scholarship is for German Universities, NTU and NUS for Singapore, and ETH Zurich in Switzerland.

Apart from these, there are Ivy League colleges with their applications like Princeton and Harvard. But most of these are constrained to pre-final years, i.e., 3rd or 4th year depending on the degree.

“Another method is cold mailing. You can find the email IDs of almost all of the professors online and then start sending out mails to them requesting them to undertake you. Most of the professors don't reply because they get several such mails. But if you are consistent at it, you will eventually get some replies. I probably mailed around a hundred professors and had a couple of writebacks. Keep a standard mail template and modify it accordingly when writing to a particular professor and make sure to mention their research and what was in it that interested you.

Another essential factor that many overlook is that many universities ask about what research you want to do. It's not an open-ended problem where the professor gives you a problem statement. I got a write-back from Cornell asking for a research proposal, and I had absolutely no idea about it. I believe that now is a perfect time to start figuring out what problem you want to work on and accordingly create at least a basic three-page draft on the problem. This gives the professors clarity on whether you are suitable.

For the Cambridge internship, one of our professors was in correspondence with a professor at Cambridge. Around February, our professor sent out a mail regarding a vacancy for a research internship at Cambridge. Then I applied and had multiple rounds of interviews. The first few rounds were to know how much knowledge you have, and the final round was an actual coding project in which they asked me to make a fusion sort of model using numerical and image data.



learning and machine learning processes. The courses which did help me a lot are Probability foundations, linear algebra, and similar others. If you are going into machine learning and deep learning, these courses play an essential role.

I realized Probability courses are important to work in any field. Another course that helped a lot was a follow-up to Probability called Stochastic modeling. I took this course because the professor was from MIT, and I was interested in it as a whole.

The electrical department offered computer vision and machine learning courses, albeit not as intense as the CS department. These courses are offered as some of our professors work on the communication side of deep

“That course helped me a lot because it teaches you a lot about Markov chains, probability inequalities, stochastic modeling, and real-time series modeling, which is the crux of what is going on in deep learning right now. It's essentially probability 2.0. Link -[NPTEL](#).

3. What prospective future projects and internships do you plan on pursuing? What advice would you give to students interested in research internships?

For the pre-final year, I got an internship at a Japanese investment bank via the Institute internships, which is somewhat different from my earlier experience. This internship seems like an exciting thing to do and something that I wanted to explore. I'd be working on price prediction of products using particle models etc.

In the third year, I took many courses, including deep learning, image processing, and computer vision. Few of these were from the Institute, but most of them are online like the [Deep Learning specialization by Andrew NG](#), and the [Reinforcement Learning by the University of Alberta](#). When I felt that I had enough theoretical knowledge, I decided to test it out and see how this works in the industry. Theoretical learning and practically doing things are two completely different things.

If you're applying for a corporate internship through some platforms like LinkedIn, you might have some rounds of interviews, and if these are some major companies, there are some tests. For a research internship, what matters the most is your resume because these research internships don't do tests or have some shortlisting criteria to select candidates. One thing that I would like to stress on is you should have an excellent academic track record. This may not be that important for an industrial internship, but it is comparatively more important for a foreign research internship. You should have some experience at least aligning with whatever you're applying for.

Even though I did not have another internship, I had done many projects and put up a lot of my project codes on platforms like GitHub. These things are critical, especially if you're applying to selective Ivy League colleges.

Now regarding cold mailing, the only advice I could give is: don't give up. Majority of people mail a few professors and stop if they don't get a write-back, but it doesn't work like that. To even get a rejection mail regardless of your profile, you will probably need to send like 30 mails because your mails don't even get read most of the time. Of course, the only difference is that you might probably get it in like 40 or 50 mails if you have higher grades. Otherwise, you might need to invest like two or three times those mails.

“Some of the common mistakes that people make when they're applying for research internships, which even I did, are that people always start with Ivy League colleges. Your first 20, 30 mails might be to MIT, Harvard, Stanford, and honestly, unless you are sort of a candidate who has got a great profile, you will not get a write-back from them.

I would suggest trying for European based universities more than the US-based as they are more open-ended. Getting a Schengen visa is much easier than applying for a permit to US colleges. When it comes to research internships, colleges might not matter much but what does matter is your work.

Even in the future, suppose you are applying to the corporate world, the companies give more importance to your work. Whenever you're mailing a professor, show that you know about the research and have two, three lines of something personal to the professor, like what he's worked on and such things. I think that that personal touch always helps.

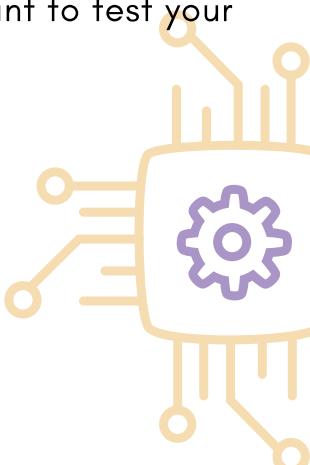
Get your resumes verified by a couple of seniors or some faculty advisor, if possible. You can also approach your professor and ask if it is possible to get a research internship abroad as they have many connections. Many universities ask for letters of recommendation, which is pretty much standard, and some of them even ask for two or three of them. The LOR plays a huge role because it basically can make or break it. The biggest advice I can give is just don't give up; you will get there. It might take a lot of time and effort, but you will get there.

4. During this lockdown period, apart from online courses, what can one do to improve their chances of landing a great internship afterwards?

Building an online profile is very important for people who are getting into anything to do with the computer. Having a good CodeForces rank, an excellent HackerRank position gives you a boost.

As the professor cannot see you face to face, all of these things show what you know. For deep learning and data science, there are a lot of projects online.

If you're stuck, you will find a lot of articles on how to do these projects. Take up some projects at a time and start doing these; that helps a lot. Once you do a fair amount of online courses, start participating in hackathons. Most of the major companies have their own set of AI hackathons. Irrespective of the result, the whole point is all about the experience. One other thing, if you have enough free time now, you can always take up a virtual internship. On platforms like LinkedIn, many companies post for internship related things. Again it's the experience you want, so it doesn't matter which company if it's the first internship you're doing, and in fact, I would always personally advise that you should do it in a startup. This is because everybody works on the project, so you get to work on real-life data and have a lot of hands-on experience. So that's the best thing you can do if you've done a couple of courses and want to test your knowledge.





Karan Patel:

Currently working as an Analyst at Dalberg Global Development Advisors, Karan Patel was formerly an Executive Director of 180 Degrees consulting at IIT Madras branch at the time of this Interview. His experiences include Summer Internship at IIM Ahmedabad and being Interim Engineering Intern at Qualcomm. He holds a patent for an IoT based product to remotely regulate temperature inside a parked vehicle.

This interview is based on his experience as a Research Assistant at MIT Sloan and during his time at 180 Degrees Consulting.

1. You were a Research Assistant at ORC, MIT Sloan, and worked on improving the E-NAM design for making markets efficient and accessible. What was the procedure you went through to get this internship? How did you end up taking up this project?

I started by individually contacting professors and showing my interest in working under them. I mentioned my previous projects, courses and other academic and non-academic achievements was fortunate to receive multiple acceptance from various labs across universities namely Harvard, MIT Sloan, INSEAD and HEC Paris.

International exposure was always a part of my institute to-do list and doing an internship abroad is something I wanted to explore as my other internships until then was in India. I was interested in operations research due to my courses and projects. Given my deep interest in Operations Research and exploring research culture in foreign universities, I was motivated to apply to various university labs. Having found that ORC, MIT Sloan is one of the best research labs in OR, I decided to pursue my interest and apply for an internship.

Working in the development sector has always been my passion. The kind of scale that I was working in was the agricultural sector in India, and contributing from a research lab that is as prominent as MIT was congenial.

I wanted to learn something new and work in the field that I was passionate about, so going ahead with E-NAM made a lot of sense, as compared to other projects. I worked on two projects.

The first involved using machine learning techniques to predict crop prices with precision, and the second was on auction strategy.

E-NAM (E- National Agriculture Market): The goal of E-NAM is to integrate agricultural markets through a common online platform to facilitate the trade of agricultural commodities across India.

This removes the imbalance between buyers and sellers in a particular place and encourages uniformity in agricultural markets across the country.

For more information, refer to [E-NAM](#).

2. How was your experience working on the project, and what did the project entail?

During the internship, I reported to my mentor who in turn reported to the principal investigator (a professor). I met the professor once or twice a month. Fortunately, the PhD student I was assigned to was a great mentor and helped me out with any queries. He was also brilliant and an expert in his field, so I felt that it was a great learning platform. There were a few particular challenges, however.



I was asked to implement a very tough algorithm in 20 days, which was pretty challenging, given my relative lack of expertise before taking up the internship. There also were a few informal sessions with the team that helped me bond with the entire lab group.

The first part of the project was making a machine learning algorithm that could predict prices of the agricultural products up for sale in Indian agriculture markets at a national level. We used **temporal collaborative filtering**, i.e., using past data and analyzing them on vectors at different time phases to predict future prices.

The second project was less of coding and more of individual thinking and reading through research papers. When you look at the auction process, there is bidding, and the highest bidder wins. But to bring greater competition among those bidding in the auction, we introduced one more layer of bidding and reformed the entire process.

So, the first stage was to identify the right auction strategy and the second stage was verifying and predicting the impact of the same on the economy. This analysis was very important because it would impact the entire agricultural market in India.

3. As an Executive Director of 180 Degrees Consulting, Tell us more about the world's largest non-profit consultancy and what role it plays in your future aspirations. How has your journey working with them been so far? What role does your prior experience in getting to this?

180 Degree Consulting is the largest global non-profit consulting for students, and they have their branches across 30+ countries. There are many branches in India, IITM being one of them. I've been an active part of the team for the past three years. It is a consulting firm managed and run by students and being mentored by professionals. We have experienced consultants from McKinsey, BCG, Bain, Dalberg who help us through our projects..

A lot of consultants from these companies who work full time give us talks, share their experiences and guide us through any issues that we face in either organization structuring or any projects that we're undertaking. We cater to nonprofit organizations and start-ups that are working in the social sector and CSR (Corporate Social Responsibility) issues that are being handled by the C-suites. The types of projects that we do are extensive, with diverse portfolios.

180 Degrees Consulting is a recent addition to our institute, and I was one of the early members to join the team, so I enjoyed certain perks and a lot of challenges. Things were initially very unstructured and complicated. One needs to bring many organizational skills into the picture to standardize certain practices that happen across the entire organization.

“Those were the challenges we faced but also something that I loved working on. Instead of just getting good results by following the guidelines, I like to take it as a challenge and standardize things independently. There is a possibility of failure, but what one learns through the process is invaluable.”

Secondly, working in this field has always been something that I was looking into, and at some point in time, I realized that consulting is something that I wanted to explore due to the kind of exposure it provides. It helped me understand if I am an ideal fit for consulting, and is it something that I would enjoy doing on a full-time basis.

The three-year experience helped me get a good start, and I hope to take it forward in the coming years by building on it.

Link: [180 Degrees Consulting](#)



4.How did you bridge the gap between academia and industry and what advice would you give to someone with similar aspirations?

I started looking into courses and projects outside the department during the second year, like in management studies and, the department of humanities and social sciences. I explored a few courses in the biotechnology department as well.

If you want to try out new things, nothing stops you from doing so - for example, opening any campus organization is not a very tricky job. They'll always welcome it if you have a good idea.

If you're enthusiastic enough to implement it, you'll always find people to execute it, who share the same thought, vision, and passion that you have. But identifying the right ones is a challenging task.

6 Then comes the part of acquiring projects. Starting might be tough wherein you might end up getting one or two projects per semester, but if you continue with the same passion, there will be more in a year or two, and the quality of projects will also improve. The kind of people who work in the organization will improve, and eventually, its brand value.

In the initial year, we did 2 projects followed by 3 to 4 projects in the next year, and in my tenure, we did around 9 to 10 projects. This year, we are on track to do even more, and even the quality of the team members' work has improved over time. As you can see, the journey has always been accelerating with like-minded people who are equally passionate about the same thing. There is nothing that stops you from starting anything you are passionate about.

There they don't look at anything else other than your online profile and skillset and these days, not even look at which college you come from. Anyone from any university can apply to get into any data centre unless we're talking about Microsoft or Google, which might be slightly picky.

5.What advice would you give on productively utilizing the present lockdown due to COVID?

There are many opportunities that this lockdown has created in the digital world and certain restrictions in the physical domain. LinkedIn is one great source to connect with people.

Based on how the industry is moving these days, there is immense opportunity in the data science domain. A lot of startups in place are welcoming students who are talented in those domains.

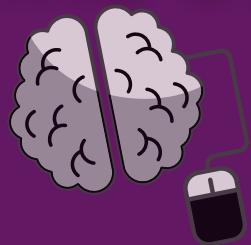
In the digital world, you can gain knowledge from people on various platforms. This is the first part wherein you can connect with people. The second part is how do you capitalize on the current situation. Let's talk about it from three aspects:

1. In the corporate sector, there's been a drop in certain kinds of businesses. As a result, they are motivating more online contributions. There is also a good number of openings in the online domain where you could contribute through part-time jobs created because companies had to minimize the cost of hiring. If you hire someone full time, you have to pay a full salary and a joining bonus. There are certain benefits to them if you are a part-time employee, so companies have started focusing on part-time internship opportunities. If you can club that thing parallel with our current situation, it will be a great add on, both in terms of the learning experience and building your network.

2. In the research aspect, many of the students cannot visit university campuses, and professors are currently short of people for their research groups, although they have the proposed research funding. I would say that this is the right time to connect with some professors and ask if there is an opportunity that you can leverage or an option that you could contribute to. So if research is something that if you're interested in, this is something you can try via the online medium.

3. Given that things are digitizing and the market boosting, there is also a good opportunity in the freelancing sector to learn specific skills. You can start contributing to things like web development or design. Something that is very creative and that you generally like to do. You can just build up your skill and work on real projects and also make money.

THE UNTAPPED POTENTIAL OF E-LEARNING



In these trying times, one particular sector that has emerged and taken the forefront of the digital world is the E-Learning Industry. E-learning refers to the use of electronic media and information and communication technologies in education. It replicates and supplements the process of classroom teaching in electronic form.

Why E - Learning?

E-Learning programs have a huge advantage over traditional learning methods because of their potential to minimize training costs depending on the overall curriculum and various other benefits in terms of offshoring, model delivery, and content selection. Their wide accessibility accelerated by cheap and more efficient internet connectivity is a vital factor influencing their massive share in the total revenue of the digital industry. In comparison to traditional methods, E-Learning often provides additional qualitative advantages in the form of learning anytime anywhere, access to worldwide mentoring tools for optimal skill growth, and administration along with the control of training calendars from various locations.

Various leading private platforms such as Coursera, Udemy, edX and Udacity offer paid courses, often also with verified certifications from leading universities and certifying organizations, that makes them very popular among learners of all age groups.

Current Trends and Statistics -

According to eLearning - Market Analysis, Trends And Forecasts Report by Global Industry Analysts, Inc. - The global e-Learning market size was 171 Billion in 2019 and is expected to grow at a CAGR of 10.85% during 2019 to 2025. Going by these estimates, by 2025, however, Research and Markets believe that it will reach a staggering total market value of \$325 billion.



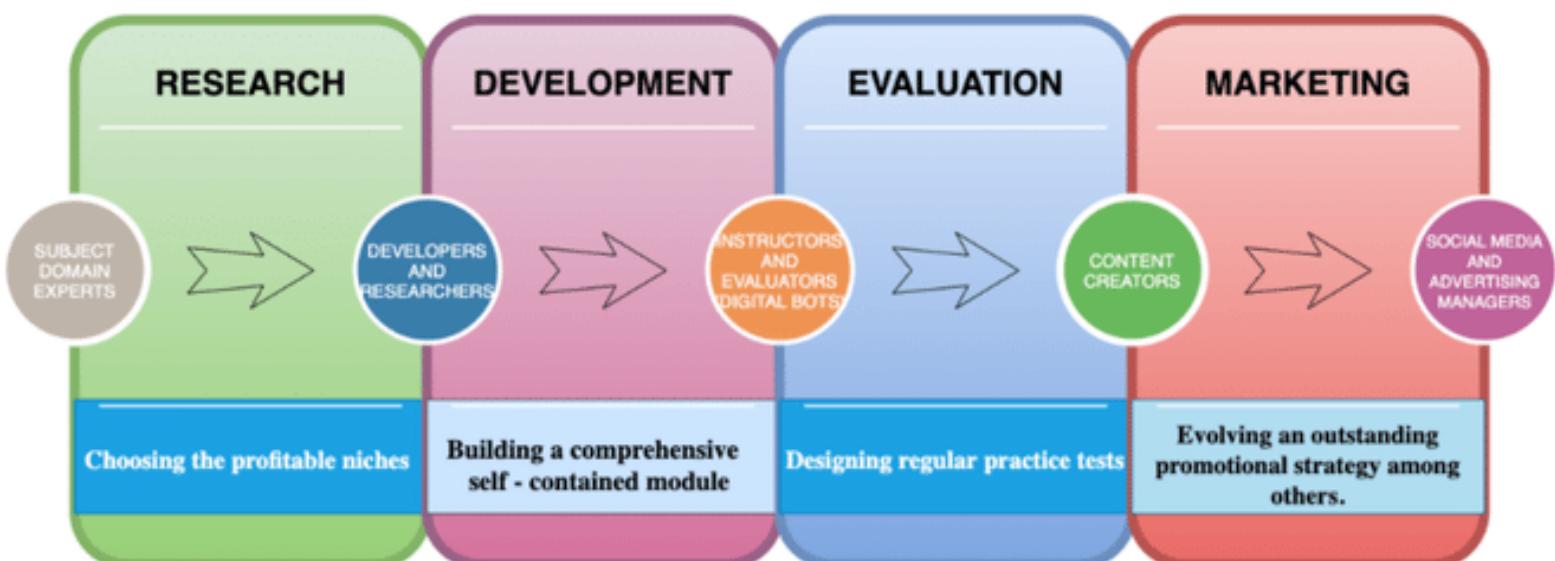
The self-paced E-Learning market, unlike the wider E-Learning industry, is going through a period of secular decline and is expected to see its total revenues fall by 6.1% per year until 2021.

The demand for the courses offered encompasses not only the students and people belonging to active research and academics, but also a wide range of professionals to cope up with the evolving trends of their specific industries.

These courses offer short, practical tutorials and assignments based on the skill-set in demand from various sectors that are either very expensive otherwise to be learnt traditionally in the classroom or are generally not included in common course structure of most of the high schools/universities.

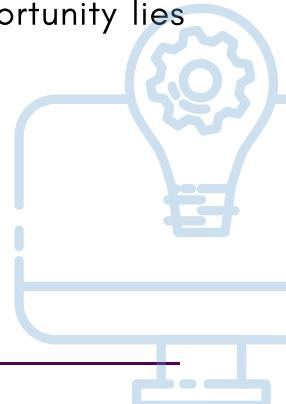
Student E Learning Startups?

Now the question that remains largely unexplored is – can the students remain only at the consuming end of this industry or can this industry be a potential recruiter or a good entrepreneurial venture for them. To answer this, we first need to consider the major factors that go into making a successful E-learning platform-



We seldom find courses offered by students while the E-Learning industry is heavily dominated by professionals belonging previously to the offline Learning industry. This is the reason why these courses often end up being mundane and relying too much on offline teaching techniques and methods which do not fall into place in an online medium

where the only mode of interaction between the instructors and students are recorded videos. This often leads to students leaving the courses midway and very poor overall completion rates of all courses overall attests to the fact. The key to turning this loophole in the E-Learning system into an opportunity lies with the students.



The Entrepreneurial Business Model

An E-Learning startup by students should be curated to have a very low-risk business model, as the capital investment is mostly restricted to skill based human capital.

“What is required is a team with requisite domain knowledge, coding skills and a marketing acumen. An entrepreneurial business model must be centered around revolutionizing the central idea of delivering lectures of online courses and making it more problem and practical application-oriented.

This model can be delivered efficiently by students because they are updated with the latest developments in the specific field and have a more recent experience of going through the same process of learning than other private instructors or professors of different colleges/universities. The fundamental difference between offline learning and online learning is that 9 Out of 10 students signing up for an online course are looking to supplement their university coursework

with extra skills rather than looking for covering an entire area from scratch. In these circumstances, the present instructors are somewhat unsuitable as they tend to cover the coursework in greater detail and students end up quitting the courses midway through. If students start teaching such courses, the focus would be on skill-based, less academically oriented short courses and will see better participation and completion rate.

Such a startup also creates many internship opportunities as part-time interns specializing in some specific areas of a general course should be an essential part of this business model to reduce overall costs of hiring professionals and also at the same time generating employment opportunities for more students.

Some companies such as Verzeo, Internshala and Indeed have started taking students interns to be part/full time instructors and subject experts which suggests the vital role students can play in this growing industry.

The Dilemma

A puzzling question that many people eager to tread into the field might have : Is the sudden bloom in this industry everlasting or was it a temporary effect of the spread of the novel Coronavirus? Will E-learning lose its charm post-pandemic?

The advantages offered by online learning are way too many to be done away with and this industry will keep growing through many more decades to come. The right business model and approach can build up a very successful venture for students looking to establish themselves in the E-Learning industry.

NOTE FROM THE AUTHOR- SAI SATYADARSHAN

E-Learning in many ways can't replace Traditional Institutional Learning primarily due to the sheer lack of confidence of learners in its veracity and effectiveness; nevertheless, it keeps growing day in day out as the quest for learning must never stop; let alone due to a pandemic.

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