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Limitations in the Contemporary Technical Education System and Ways to Improve them

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Abstract

Ancient India had a "GuruKula" system in which a guru ("the dispeller of darkness") trained his disciples who emanated from different walks of life. The guru knew the strengths and the weaknesses of each of his disciples. For example, the mythological Dronacharya (of the "Mahabharata" fame) made "Arjuna" the master of archery but shaped "Duryodhana" as the ace in mace-fighting. This arcane system has transformed into a commoditized and commercialized present-day education system (thanks to money) that we are witnessing. Technical education (Engineering in particular) still has the charm. Yet, in the ever-changing world of demand versus supply, it is an absolute necessity for us, educators, to prepare our students for the future of the new India and for the benefit of mankind. The students should be industry-ready by the time they graduate from college, regardless of the course they are pursuing. Unfortunately, what we witness today seems largely an "outdated school of thinking" where an instructor is complacent about his/her craft – mainly because he/she has been teaching the same subject usually the same way, for several years. This system has serious flaws. Life is all about new ways of learning and learning new ways - forever and continuously - to keep oneself intellectually motivated and satisfied. The moment we as teachers feel adequate or self-sufficient, we are heading for a slow but sure disaster and make ourselves outdated in the process, like an expired drug. So, better late than never. We, as instructors need to be emotionally closer to the students (many students still see their parents in their teachers) than we currently are, as the expectations from the new generation have changed which wants guidance, mentoring, coaching, and hand-holding. Education has been the only industry in the world where the student – your customer - pays large sums of money and never complains about the quality of the service received. Even this, is changing. We, teachers, learn from our students all the time. The students are more savvy in using modern tools and technology and new ways of thinking. It is the time we align ourselves**.**

***Keywords*—** Complacent; Engineering; Gurukula; Intellectual Motivation; Outdated; Modern Tools and Technology.

***JETLP Category*—Practice**

Comparison between Gurukula and Modern Education in India

We see numerous great examples of Sages and Gurus interspersed throughout the Indian literature who have changed the destiny of some of the greatest human minds. The word "Guru" in Sanskrit has a special connotation and meaning. It transcends the English meaning of the word "teacher". These sages were omniscient, adept in handling all aspects beyond basic education, and masters in multiple arts and disciplines - simultaneously. They could influence the Kings as the royal princes were studying under them. The kings venerated the sages they deserved because they

were selfless, non-greedy, and apolitical. They would only ask for what was known as "Guru Dakshina" when needed. The wives of these wise men became the empathetic mothers of the pupils who were away from their mothers for long periods. The other students under the tutelage of the same guru became their siblings and eliminated the pangs of separation from their siblings.

In contrast, the modern education is commercialized and commoditized. The Government is partially responsible for the state of affairs along with others. The Governments have sanctioned "more than required" Engineering colleges due to their knee-jerk reaction to meet the short-term demand surge without thinking strategically. What happened as a result? There was an abundance of engineers in the market, most of who had joined the course not because of passion but because of the lucrative future it seemed to have. The Governments have not factored into account the available jobs in the market, the growth rate (year on year) of jobs in the industry, the relevance of the education system for the current job market, and most importantly the quality of the education. In our country, it was common knowledge that anyone who could not get an industry job would end up being a teacher - not because of passion or interest. Why? Because that was the only way to survive on the battlefield of life. Teachers are paid very less compared to their counterparts coaxing that it is a noble service (even today, this is true).

Some smart individuals found out it was easy to make money if they had Government connections - by opening an Engineering College (with no infrastructure in some cases). Some of them palm-greased the right politicians and founded education trusts as a haven to avoid income taxes and became millionaires via capitation fees within a few years. To put a nail on the coffin, there was reservation in the country. Sometimes, a rank holder did not get an engineering seat in the college of his/her choice or the course he/she wanted to purse and ended up choosing an alternate career much to his/her dismay. We did not need, do not need, and perhaps will not need meritocracy in this country. As usual, there is exploitation of every kind. Today, we are in a situation where some Engineering courses are either closed or have no takers. There are other subjects and courses that we teach which have no future as they have no relevance in the job market. Some courses are outdated. Other courses have no focus on practical knowledge which is a must for every engineer. No wonder, 98% of the software still comes from America and all advanced and sophisticated machines are built in other countries. All we have is service industries whose balance sheet depends purely on the financial health of other nations. These industries have made our engineers slaves to multi-national organizations.

What needs to change?

Firstly, change should come from the individual self. She or he should think or be counselled that any field is as good for a career as any other and engineering happens to be just one of them. The key to success is passion and interest. Some people discover it at their very early age and the rest do not. These rest are the ones that are typically goaded and pushed around by their parents. So, parents need to be coached too. Both should be made aware that it is the interest or passion that matters in life, nothing else! We should educate the society at large and convince people that any career can be chosen by anyone provided they have some inclination. We should have dignity of labor in the first place, in this country. The chances of an individual excelling are higher only if she or he has admiration and respect to the chosen career. Money and fame follow automatically if you are good at what you do. We still have the Tendulkars and the Vishwanthan Anands in this country because they did not practice anything else but their chosen craft and hence

excelled in life. They did not become engineers but they have become role models for millions of aspiring youths.

Secondly, change should happen from us, the educators. One should never become a teacher unless one is interested in teaching (and nothing else). There is no point in becoming a teacher because it is easy to teach (it is not – ask your students for feedback and their truth might shock you), or you do not have any other career path to choose. You will not only be cheating yourself but you will cheat your students too. Educate yourself as much as you can in the field of your interest and excel. Being ordinary will not help. You have to be above the rest of the crowd.

So you are a teacher now. Next what? Be open to accepting the teaching profession with all its nuances, advantages, and disadvantages which is part and parcel of any profession. Be ready to learn new things each day and new ways of learning each day. Embrace technology. Today, you have extremely good Artificial Intelligence (AI) tools that are at your fingertips - such as ChatGpt (from OpenAI originally and now from Microsoft), Copilot from Microsoft, and Gemini from Google – just to name a few. You should master these tools because they are disruptive technologies. They are a culmination of decades of research from hardcore engineers. It is better to learn them, install them on your Personal Computer, and use them like your personal secretaries to your maximum advantage.

You should innovate constantly in your chosen field and become a scholar to be recognized as an expert. You need to explore new horizons and practice more and more especially on the practical aspects of your field or domain, rather than the theory, as engineers, who are your customers are expected to solve real-world problems of a large magnitude within the known constraint. If you cannot solve a problem yourself, you cannot teach it to others. If you are hesitant to use technology you are already outdated. The author has witnessed teachers using the old chalk and talk. More importantly, they justify that it is the only method of teaching. You cannot cover the entire engineering syllabus if you keep writing on the blackboard all the time though this practice exists even in some of the best colleges in the advanced western countries. Use modern tools. PowerPoint is meant to be your friend. It can save you valuable time which you can put on your research. Your health could also suffer if you use chalk all the time. First, please remove the veil of pride from your mind and be open.

If you are the head of the department you have more responsibilities. Encourage your staff to take new subjects each semester. It helps you distribute the work well and creates the required number of teachers who are experts in the same subject, over a period of time. Your department will improve slowly but surely. Be the change agent. Be open to use the tools to come up with automated time table instead of assigning the morning fresh hours to your favorite staff. Develop a project to be executed by your staff each year collaboratively so the gap between the industry and the academics is known to you and your fellow staff know how it is to work in industries. The author has heard some comments from the heads of departments that software is just typing on the keyboard and is a hype. There is a good reason why brilliant engineers make more money. They bring in revenue to the company they work for.

Kindly focus more on practical aspects and do not separate lab and theory classes. They should go hand in hand. Teach some theory and let the students practice the concepts instantly. Have surprise tests and quizzes often and encourage this practice among your staff so students

come prepared. Grade them on this. Remove tests which are announced well in advance. Do not ask them to write only descriptive answers. Even Multiple Choice Questions (MCQ) can be used very effectively to check if your students have grasped what you have taught. The author has taken some faculty development programs via NPTEL – a government of India undertaking and highly appreciates the examination pattern. Stop worrying about attendance. The author has studied in different countries and there was no attendance anywhere except in India. Be empathetic towards your students and do not create a fear factor. They mentally become closed to you if you are a strict martinet.

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Author Bio

The author is an industry veteran, having spent most of his time developing world class software products in prestigious multinational companies such as - Hewlett Packard, Sun Microsystems (which is Oracle now), Lucent (which became Alcatel Lucent and is Nokia now) and of late in DealerSocket (Solera now). He has 35 years of experience out of which 30 years in software development. The rest of his experience is in teaching. He has played different roles – business analyst, coder, tester, designer, architect (even at enterprise level) and manager. He has avid interest in reading, writing, debating. His research interests include developing micro-services based complex full stack applications using REST APIs and using modern frameworks such SpringBoot (for backend) and React JS (for front end). He is interested in teaching Operating System, Networking and Network Applications.

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