

# Challenges in Acquisition of New Courses in Education, Bachelor of Technology in SD VS Traditional CSE Program: A Case Study of M.M. Deemed to Be University

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**Abstract**— With rapid advancement in Technology and its demand in industry rapidly forcing Universities to take help of course content writers or open education resources to make changes in the existing curriculum, that must fulfill requirements of industries which they're looking from fresh graduates. Even though development of new courses or enhancing the quality of existing courses by adding topics of more demanded technologies is a time consuming job yet as a result these time variant practices makes candidates job ready. In reality there are huge innovations in our lives based on engineering technology, but university curriculum not keeping pace. In this particular research article thorough study about bachelor level Software Development program discussed and suitable comparison with respect to existing program provided.

**Keywords**-*Course Content Writers (CCW), Communication Skills (CS), Distance Education (DE), Faculty Development Program (FDP), Open Education Resources (OER), Open Sources, Software Development Program (SD), Self-Learning-Material (SLM), Video Conferencing (VC)*

## I. INTRODUCTION

Engineering education community captured more attention worldwide as compared to others in past few decades. Specifically in Computer Engineering lots of innovations/advancements has happened which changes the face of modern digital world. From the time Internet came in light, working culture of industries tremendously changed, as everything is interconnected. Due to advancements in technology IT industry adapting these new technologies rapidly in order to provides reliable services as well as to win the completion in market with each other's. Like (As per our study examples should be from Software area we're providing time to time) if we take a look on databases previously RDBMS (SQL) was in demand but from past one decade (No- SQL) achieved lot in industry, similarly some Open-Source products widely used by developers Nowadays which was not the case earlier? So the thing is with such changes in technology, demand of manpower who can work very well with such advanced technologies increases day by day. ***Skills gap needs to be addressed by universities, and this problem has existed for many years and doesn't seem to be getting fixed.*** The conception here is that with respect to advancement in technologies adapted by industry similar changes have to be done in academic courses. So that newcomers who're pursuing their graduate or undergraduate degrees can enhance their skills during the academic only as

soon as possible. But there are lots of obstacles in the way of course development, which every university has to tackle first while initiating that task. There are various notion comes in mind while new course development task takes place, it may be possible that university is hiring senior Content Writer or gonna use Open Education Resources for making enhancement(s) or Video Conferencing [1] (VC provide the technology that preserve the dynamics of human interaction), decision depends on the situation or content already in hand, both the methodologies have their own pros and cons. Okay let's talk on both these choices in a bit. Open Education Resources means information is freely available and accessible for everyone i.e. traditional as well as non-traditional learners can take benefit from it. So that with open license facility adaption, repurposing of education contents can be done without any hurdle for seeking of permissions. OER are quite helpful but sometimes suitable or necessary amount of information for writing contents of new course not available, on these situations utilization of content writer takes place but having its own drawbacks like: Time- Extensions, Plagiarism, Revision, Cost etc.

Apart from all these issues while developing new course, permission has to be taken from educational government bodies regarding how much alteration has to be permitted in existing courses. The new SD Programme developed and launched in MM(DU) by considering all these phases and

issues in order to fulfill the requirements of current market which it's seeking from new pass outs. In the upcoming sections detail about Bachelor of (Traditional), Computer Science & Engineering Course, new SD Programme and suitable comparison with each other provided. The rest of the paper is organized as follow. Section 2 described in detail about Traditional Bachelor of Technology Programme (B.Tech CSE), Section 3 covering Issues or Challenges of new academic Programme Design/Development, Section 4 and 5 providing interpretation of new Innovative Programme (B.Tech SD) specifically for Computer Science stream and then Analysis of the study. And at end Conclusion, References takes place.

## II. TRADITIONAL BACHELOR OF TECHNOLOGY PROGRAM (COMPUTER SCIENCE AND ENGINEERING)

Computer Science and Engineering is an academic Programme run by many universities & institutes all around the globe which integrates the field of Computer Science, Information Technology and Engineering [10]. In that particular course 'Computer Science and IT' forces typically to study about upper-division courses (i.e. Algorithms, AI, Graphics, Operating Systems, Software Development, Database Management etc.) theoretically and bit practically about hardware, software dealing And similarly 'Engineering' forces to resemble lower- division courses (i.e. Digital Electronics, Control Systems, VLSI Design, Machine Learning, Discrete Mathematics, Robotics etc.) which introduce about dealing with media, architecture of systems etc. still theoretically and bit practically [8][9]. Engineering here skews heavily towards the electronics that it has more in common with Electronic Engineering (EE). That means main agenda of this course (CSE) is to build a solid understanding of the entire machine among students. The conception behind this course still as it is from many years very less alteration made by course content developers, as well as similar scheme/syllabus/way of delivering the course, specifically followed by domestic institutes. Even though the notion about telling everything to students regarding 'Computer/IT Devices' is good yet lack of practical work at least for particular subject from all, focusing on everything influencing the quality of students. Yes, some universities/institutes refining their way of teaching that particular course but 'would it work or not?' May be this is an endless talk. There're some major points belong to traditional ongoing programs are:

- Faculty teaching the same things that they have learned in university, previously because of lack of enhancement in curricula.
- Curriculum not changed in many years by course content writers (taken from IIT, IIIT and NIIT Universities).

## III. CHALLENGES IN DEVELOPMENT & ADOPTION OF NEW ACADEMIC PROGRAMS

Innovations or developments take place in corporates (Academic/Non-Academic) from so long with respect to technological advancements but before actual acceptance of conceptions various challenges arises [3]. In this particular section we're discussing about challenges which raise their head while we're developing and adopting new courses in education. Some of these critically influencing the overall process and some have moderate effect.

### A. Course Content Development

The biggest challenge here is designing and development of fruitful study material which will be covered in pre-specified time-bound for students/learners. Further as per UGC guidelines all undergraduate/post-graduate courses have to be revised in order to facilitate '**Choice-Based- Credit-System**' unfortunately which demands major revision in syllabus as well as study materials [7]. Now, the major issue is how to prepare the study material/course-content:

- Buy the study material from other universities.
- Develop it with the help of Subject Experts.

Both strategies have their own drawbacks, like in 'A' it's costlier to buy course content from corporates (i.e. huge sum of money as license fee), similarly in section 'B' if we take help of expert it's have like: 'Time-Consumption', 'Cost' and, 'Plagiarism-Issue'. So best way apart from these two is to use OER for writing the course contents but, if enough material is not available only then use either 'A' or 'B' options. Let's have a look on traditional course development timeline [7] in below given table:

Table 3.1: Programme Design and Development Timeline

S. No	Activity	Time (Days)
1	Preparation of Proposal and Approval of Course	10-20
2	Meeting with Expert Committee Members for Designing Syllabus/Scheme of Course	10-15
3	Approval from Board of Studies regarding developed Syllabus of Course	10-15
4	Organizing Seminars/Workshops for identifying suitable course Content Writer (if not using OER)	05-10
5	Distribution of course contents to Content Writers	10-15
6	Course Writing	90
7	Any Extension	30
8	First Review of content received	30

9	Revision of rejected contents to Content Writer	90
10	Further Extension (if needed)	30
11	Second Review of revised contents	30
12	Dispatch of units to Course Editors after approval from authorities	15
13	Editing	90
14	Any Extension	30
Total: 510 (Day) or 17 (Months) [Approx.]		

### B. Demand of Industry

Due to big boom in technology giant of corporate world altering their way of working, as speedy technology changes forces them to rapidly enhancing their productivity with new innovative conceptions/notions because of highly competitive environment. Behind any company there is manpower, so because of these alteration(s) demand of any company increased from new pass outs in order to higher them successfully as a trainee even without any hesitation. Even though this is on the positive side of corporates but same is not true for education industry, due to such high demand universities/institutes have to make changes in their curricula which again a big challenge and necessary to stay up to date, match themselves with current market requirements. So for that universities has to update their courses, hire new employees, organize FDPs which is a costlier/time-consuming job again. Before these entire one more task which has to be fixed approval from government education bodies, which takes too much time to complete.

### C. Motivation Toward Course(s)

The development and initiation of new academic courses doesn't just enough, 'How to motivate students for these?' again a big question. For that lots of **seminars, advertisements, counseling-session** have to be made by concern universities in different regions of nation at least, which again consume time and requires money, resources for organizing all these events. Some major points here are:

- It seems reasonable that parents and students would be suspicious of new courses until they prove themselves.
- At same time, students and parents need to understand that end goal must be student acquisition of skills.
- Until results from new programs are known additional resources will be required to entice students and their parents to join new programs.

### D. Teacher's Competence

#### Ethical Competence

Faculties create a positive working and learning environment as we're always assuming, looks students as learning-partners in a relationship build by mutual respect. It's highly

demanded from faculties to use student's input and provide space necessary to promote their creativity & support them in developing their professional identity. But issues arise when faculty himself doesn't aware about basic ethics of that particular profile while working as well as if he is still following traditional way of teaching with less practical work how he can be able to motivate his students and support them. So in order to deal with that particular problem lots of efforts have to be done by universities/education bodies.

#### Evaluative Competence

It is primary duty of engineering pedagogue to develop reliable instruments for assessment of (evaluations) professional engineering skills, which afterwards help them to evaluate students using both Quantitative/Qualitative means to continually monitor and record student progress. But development and utilization of these instruments/parameters is very challenging task. Sometimes for development of such parameters raise the need to take help of third parties (i.e. or have to buy third party tools) which again a costlier process.

#### Social Competence

Teachers especially those who belongs to engineering stream works in team, doing efforts to establishes their own vision & mission of teaching. Afterwards they want to effectively relate it with vision & mission of their colleagues in order to contribute for development of new guidelines of modern process of teaching for that particular course. But for that to reaches at specific decision by mutual understanding is also a tough task. To develop domestic/international network (e.g. involving guest-lecturers, calling persons for expert-talks, organizing FDPs) that contribute to knowledge in that field and effectively communicate it to colleagues is also a difficult task, which helps latter on for improvement in existing pedagogy.

#### Technical Competence

While developing new courses very first thing judged by committees whether course is up to current demand of industry then very important or crucial task is: (Have we're with enough resources? i.e. Teachers who're going to teach have enough knowledge or not, It's a important task because university is bound to deliver high level of technical knowledge to enrolled students while they studying) [6]. So for that Technical Test have to be conducted before shortlisting candidates for specified profile. Apart from this for existing employee FDPs have to be conducted in order to enhance their teaching/technical skills. For these types of activities time/budget have to be managed, which again raise my sub difficulties. If everything done positively then afterwards while course getting started monthly or quarterly review on course has to be taken, which again raises too many difficulties?

### E. Cultural Change(s) [Faculties/Students]

Since the Indian students are used to studying in a certain way throughout their school years, they take a little time to adjust themselves to new innovative way of learning and working. The traditional way of learning is by going through books and appearing for examinations (whereas this program (SD) focuses on a more practical approach of learning i.e. "Learning by Doing") [12]. The concept of deliverables is also completely new to the students as well as the faculty. The faculty is also used to teaching in a certain way (i.e. must be aware about the teaching objectives) and hence also takes some time to get accustomed to this new way of teaching [2]. So for that efforts required from both sides.

### F. Unique Fee Structure

Setting the right fee structure is quite essential for an educational program. Since it provides Professional-Education-Services, the quality of the program is higher and hence the cost.

- New courses may be more costly than traditional one (faculty need more practical background), at least at first. Who absorbs this cost (student or university)? a major question always be there.

## IV. ALTERNATIVE TO TRADITIONAL BACHELOR OF TECHNOLOGY PROGRAM (SOFTWARE DEVELOPMENT (B.TECH SD))

Even though the traditional bachelor level course about which we discussed in section-2 working at moderate rate with respect to high (demanded IT skills) demand of industry from new pass outs, in order to fulfill to this greedy need of industry change in existing curricula or development of new innovative course is Necessary. So for fulfilling that need 'Maharishi Markandeshwar Deemed to be University' took initiative and with imperative study invent new course 'Bachelor of Technology on Software Development' (SD Programme) [5] [9] [12]. What's make that course distinct? is now focus just on one area 'Software-Development' that's it, Programme coordinators and faculties encouraging students from semester first onwards to devote yourself for that particular area fully w.r.t. the demand of industry from that area only, that means candidate don't care about hardware/networking/cyber security and all, just work for software/web/mobile-app development by relinquishing others areas and build them to deal with real life problems.

There're two primary reasons why parents send their children's to universities:

- So they become well prepared for a sustainable career in a well-paying field.
- To develop them into happy, productive citizens capable of fully participating in their world.

That particular B.Tech SD Programme carefully designed by Maharishi Markandeshwar Deemed to be University in order to produce type of graduates who will be:

- First, become 'Job-Ready' for a specific job role such as 'Software-Developer' with expertise in specific technology (e.g. Java/Python/.Net/Php etc.) and 1-2 years of work experience.
- Second, that particular program immerses/polish students into a simulated work environment where, from day one, they work as 'Interns' on realistic projects to produce real industry deliverables using real industry processes and tools.

Candidates enrolled in this specialized SD Programme will get full four years of 'On-The- Job-Training', but in highly safe environment where mistakes are lessons to be learned. Of course, none of this would matter if the software industry will be in decline, however it will not ever. Industry call (i.e. specially in Software development stream) for at-least 50% growth in very well paying jobs requiring justifiable expertise over the foreseeable future. The imperatively studied and designed SD program focuses on the five things that every graduate have to have to become job-ready in nice corporate for the 'Entry-Level-Software- Developer' role, which are:

- Knowledge
- Technical Skills
- Soft Skills, primarily CS skills (English)
- Behavior Skills
- Experience

Student(s) role-playing as intern(s) gonna acquire each of these by working hard on realistic projects throughout their four years in this Programme, producing Deliverables and, receiving Feedbacks/Reward on deliverables from concern faculties. From their iterative project work (i.e. semester-wise) students implant a portfolio of projects on which they had worked for and can share with corporate hiring managers during placements, demonstrating the real-world experience they had have during their time in the SD Programme. Apart from building technical skills in that particular programme students also are enforced to acquire training on Behavior-Skills. Mentor's don't teach student(s) how to behave, he/she learn that behavior has consequences (i.e. choose your behavior, and live with the consequences). From very initial day onwards student work as intern in tiny team, especially forcing him/her to interact with others as well as to improve their ability to navigate the world of Human Interaction through Awareness and Analysis of Behavior and Situations. Side by Side student(s) are mentored on their behavior by their faculties/mentors, as well as on the content they're 'Writing, Volume and Quality' of their work with respect to given timelines/deadlines. As per imperative studies while developing SD programme we can say truly it's a unique. Programme which helping students to learn the importance of behavior skills, and how to deal in variety of situations and contexts found at work and in personal life.

## V. COMPARATIVE ANALYSIS OF TRADITIONAL CSE AND NEW DEVELOPED SD PROGRAM

From our imperative study about both the courses/programme which are running by 'Maharishi Markandeshwar Deemed to be University' and fulfilling demanded requirements of industries/corporates as well as students who enrolled in these specific courses, it's hard to say who is superior as both the programme have its own pros and cons, about both similar craze we can see among students w.r.t. their way of thinking. Even though new launched SD programme gaining its importance at very high rate among students yet existed Traditional CSE programme

[8][9] stayed intact from any loss. If we're interpreting that SD [9] includes more practical work than Traditional CSE its absolutely true too, because SD was developed just with one notion and vowed in mind that to build students for industry as they want i.e. make them practically well-versed about at least particular technology like software development with particular language so that they will become Job-Ready at early stage without going through any further internship after passed out. Now we're going to provide suitable comparison of both the programme with justifiable parameters in tabular format, in order to show which are the strengthen part and weaker part of each programme, so that we can take careful look while making further enhancements.

Fig 5.1: Comparative Analysis of SD VS Traditional Program

S. No	Challenge	Parameter	Traditional B.Tech Computer Science & Engineering Programme	B.Tech Software Development Programme (SD)	
1.	Demand of Industry	Project Work	Yes (Only in V, VI Semester)	Yes (Every Semester)	
		Program Outcomes	A. Course Level	B Only	Both (A,B)
			B. Program Level		
		Focus on Behavioral/Professional Attitude	No	Yes	
		Scope (i.e. Job Ready)	Moderate	Very High	
Productivity Measure	A. Effort	A Only	All (A,B,C,D)		
	B. Predictability				
	C. Quality				
	D. Volume				
2.	Content Development	Pedagogy	A. Lecture Test B. Immersive, Project- Based Learn-by-Doing C. Student Treated as 'Intern'	A Only	B, C
		Resource Utilization (Time, Money)	High (Every Time)	High (Just Once)	
		Resource Utilization (Persons)	Less	High	
3.	Motivation Toward Courses	Entice Candidates Towards the Program	Less Resources Utilization	High resources Utilization	
4.	Teacher Competence	Ethical	Not Covered	Covered	
		Social			
		Technical			
		Evaluation	A. Deliverables (As in Corporate)	(B,C)	All (A, B, C)
B. Assignments					
C. Tutorials					
5.	Cultural Changes	Student & Faculty Acceptance of Pedagogy	Currently Not a Challenge	Challenge	
6.	Unique Fee Structure	Program Cost	Less	More	

## VI. CONCLUSION

In this paper, we're giving suitable interpretation about education system of nation, various ways of developing/designing new programme with respect to time by time requirements raised by corporate world in front of universities/institutes. Major challenges which have to tackle while designing new programme course contents and, strategies we can follow. Apart from all these our major concern was on two highly demanded and equally important programme run by our university (Bachelor of Technology in 'CSE' and 'SD'). What're the hidden things behind which forced university to design SD program. Why SD gaining its importance among students and fulfilling requirements of industry in order to make them job ready, which is the major pearl of that particular programme.

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