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Model study scheme for Computer Engineering at graduation level in Indian Universities

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Abstract

This paper is an attempt to propose an ideal study scheme for Computer engineering programme in Indian Universities to keep pace with the practices in foreign Universities and ever demanding global market. Present curriculum of Computer engineering is quite rigid and largely outdated in Indian Universities which fails in evolving good technical skills and attitude in young engineering graduates. In last century, world has witnessed a huge change in technology where IT sector occupying a huge base in developing world economy. In last three decades, India has contributed a number of talented IT professionals to the world but with the increase in privatization, globalisation and technological explosion, it lacked proper syllabus up gradation. This has lead to a crowd of clueless graduates unemployed or underemployed with inappropriate skill set. The major reason is the lack of flexibility in the nature and contents of courses being offered specially at undergraduate level. Therefore, this paper thrusts upon the need of adequate and flexible study scheme. Thus, an empirical survey of the stakeholders i.e. Computer engineering students, teachers and IT employees has been conducted to reach the conclusion.

1. Introduction

From the beginning of 21st Century, India occupied an important place in the comity of nations especially in terms of the world trade. The last decade has witnessed an era of joint ventures, mergers and acquisitions of international companies by Indian industrialists. Even at the time of global economic recession during 2008-09, India stood strong with its stable economy. It became the world leader in IT and Software industry primarily due to inherent mental capabilities on one hand and the theoretical and analytical education training imparted to its youth on the other. At the dawn of independence, there were hardly 4 degree and 8 diploma institutions. There are at present 222 degree and 203 diploma institutions, with intake capacity of 63,515 and 50,479 students respectively. There are approx 3, 00,540 Computer engineering seats available in India for undergraduate courses.

This phenomenal growth in the number of engineering institutes has led to a steep decrease in quality, though some of them are accredited by the All India Council of Technical Education (AICTE) or other bodies but lack proper updating of syllabus of different courses with changing market and global trends. Corporate culture welcomes and attracts numerous young just grown fresh engineering graduates to the word of multinational work culture and practices. After globalization, liberalization and privatization, the market has become very demanding; suddenly we are pushed into a situation where there is no excuse for the incompetence.

In 2007, NASSCOM report said that by 2010, the IT industry in India might face a shortfall

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of 500,000 professionals, if proactive steps not taken for enriching syllabus contents. The highest employability rate of Computer engineering graduates was 23% among the records of past 10 years. Another problem is the failure of huge number of Computer engineering graduates in cracking the GATE (Graduate Aptitude Test for Engineering) exam in past few years. The percentage of students cleared GATE was 13%, 16% and 14% in 2013, 2014, 2015 respectively. This trend shows that not even quarter of the total Computer engineering graduates, who appear for GATE, are able to crack an aptitude test specially designed for them. With this focus, this paper will try to present required modifications in Computer engineering curriculum for achieving better employability of fresh pass-outs.

2. Objectives and scope of the study

The objectives are

- To identify the weak areas of the study scheme for the graduation in Computer Engineering presently followed in Indian Universities.
- To propose the required modifications in study scheme for better technical and entrepreneur skills of Computer Engineering graduates.

3. Research Methodology

A. Sampling scheme

This research involves data collection from teachers, employees and students of the Computer engineering field. The students chosen have completed their graduation in Computer Engineering. A sample of 100 respondents from different strata has been taken for collecting feedback .The scheme of sampling is described in tables (Table 1 and Table 2) given below:

Table 1: Sample Distribution

Population Strata	Gender	Sample Size
1. Teachers	Female	38
	Male	14
2. Students	Female	30
	Male	9

In institutes, the number of female Computer engineering students and faculty members outnumbered the male students count. That is why in the number of female respondents in both strata is approx. three times the number of male respondents.

Table 2: Sample Distribution

Population Strata	Sample Size
1. Govt Institute	8
2. Private Institute	84
3.IT Firm	9

In India, there are hundreds of private engineering institutes which provide education to more than 80% of the total students at under graduation level while government institutes are very few. So, majority of responses have been collected from private engineering institutes.

B. Data collection tools

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Questionnaire-cum-interview method was used for the collection of primary data from the selected respondents. The questionnaire was designed according to the basic requirements of study and literature survey done so far with thorough discussions with students, teachers and researchers. General observations and suggestions that were out of the scope of questionnaire were also recorded as notes and considered during the analysis and recommendations.

C. Processing of data

The responses were in the form of selection between alternatives and on a five point ranker scale with scores ranging from 1 to 5. These were fed into Microsoft Excel software for further processing. This data was transferred to SPSS files for analysis. SPSS helps in easy and fast calculations for recording frequencies of ranking scores and cumulative percentages of the responses.

4. Analysis and interpretation

Results of analysis are presented in terms of present system problems, modifications and papers in the curriculum categories as given below:

A. Problems in current System

I. Majority of respondents feel that rigid curriculum and lack of interaction between industry and institutes are the two prominent reasons for high unemployment rates among Computer engineering graduates as shown in Figure 1 given below:

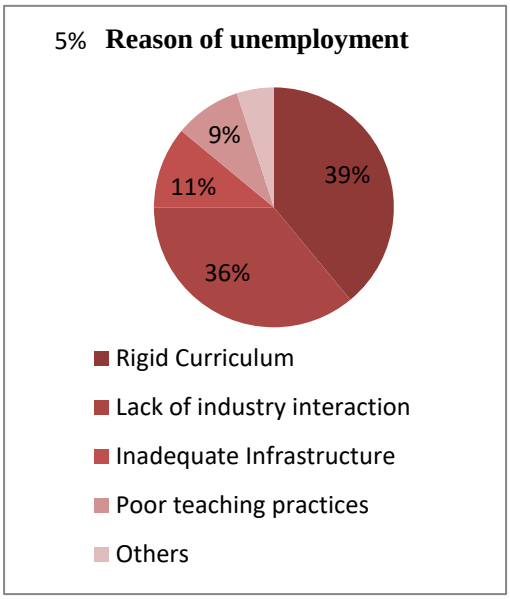

Figure 1: Reason of unemployment in Computer engineering graduates

Above pie chart depicts the reason of unemployment in engineering graduates. 39% respondents feel that rigid curriculum is the prominent reason while 36% feel the lack of interaction between institutes and IT industry is responsible for this. Lack of technical infrastructure and poor teaching practices are selected by resp. 11% and 9% respondents while 5% responses suggest the reasons for unemployment are mushrooming of private engineering institutes and lack of Research and Development activities in the field.

II. Respondents are satisfied with CCE (Continuous and Comprehensive Evaluation) system followed in Indian Universities.

III. Personality development programs and programs for student's interaction with IT culture are not much effective according to the feedback.

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IV. Respondents feel that the basic infrastructure in Indian engineering institutes has improved a lot now but technical infrastructure still needs more efforts and investment especially in govt institutes.

V. 66% respondents feel that in graduation some subjects got repeated as electives while many subjects of current relevance are not even introduced.

VI. A majority of respondents i.e. 84% feel that the practical work they have done during graduation was not sufficient for technical skill development.

VII. Very few respondents feel that practical contents in the curriculum they have studied were adequate for technical knowledge. As shown in the Figure 2, respondents feel that in curriculum more weight age is given to the theory papers resulting into an imbalance in theoretical knowledge and technical skills.

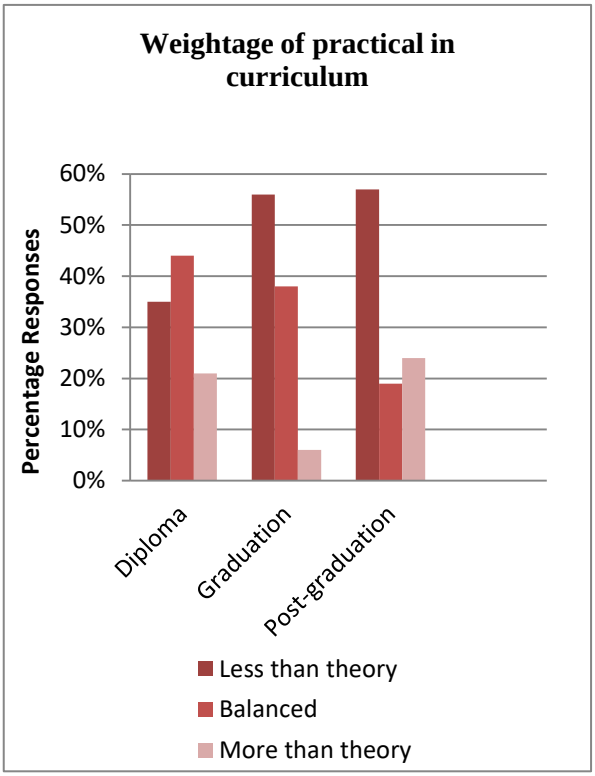


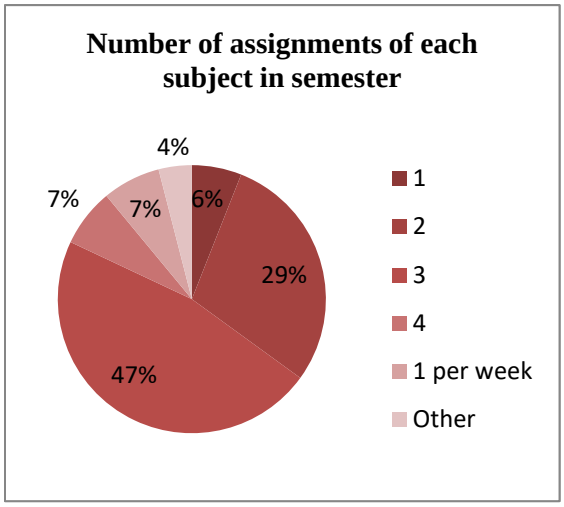
Figure 2: Percent weight-age of practical papers in present Computer engineering syllabus

In above figure, approx. 30% respondents feel that the ratio of theory to practical papers is appropriate while about 56% responses accept that there is a huge imbalance between theoretical and practical papers in Computer engineering programme in Indian Universities.

VIII. Majority of respondents feel the schedules of training are fine but project allotment and evaluation system is very poor as very few projects are directly or indirectly useful in market.

B. The required modifications in the study scheme of Computer Engineering programme in at graduation level

I. All respondents feel it necessary to sign a global standard (e.g. Washington Accord) for Indian Universities or their regulatory bodies to achieve and maintain the recognition and equivalence at global platform in the field of engineering education.



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II. More than half of the respondents feel that only 2 mid-term-assessment exams are adequate for graduation program while some feel that the practice of selecting 2 out of three midterm exams is more suited for better evaluation of a student's performance throughout the semester.

III. According to responses, 2 or 3 high quality assignments of each subject per semester are favoured by the respondents as more number of large assignments can trouble students, represented in Figure 3 given below:

Figure 3: The appropriate Number of assignments of each subject in a semester

As shown in the above pie chart, 47% responses are in the favour of three assignments of each subject in a semester whereas 29% have chosen only 2 assignments for every subject. 6% respondents insist on setting only 1 assignment while 7 % feel need of 4 assignments for each subject.

IV. At least 4 hours of practical time for every subject in a week are necessary with small projects in semester.

V. 72% of the respondents feel that practical syllabus should be designed with the help of IT employers so that students can learn to handle real problems of IT world.

VI. Students feel that industrial training programmes are very important for their career perspective and give valuable feedback on the on optimal training schedule is shown in Figure 4 given below:

Figure 4: Training schedule for the Computer engineering graduation programme

37% feedback is in the favour of 8th semester complete for training and 2 months after every year in first three years while 32% select 2 months training after every year in 4 years of graduation.

VII. A vast majority of respondents emphasise on the need of student exchange programmes between Indian and foreign Universities to broaden student's exposure to the world level engineering education.

5. Recommendations

- The Computer engineering curriculum followed in Indian Universities requires immediate attention for up gradation of its contents.

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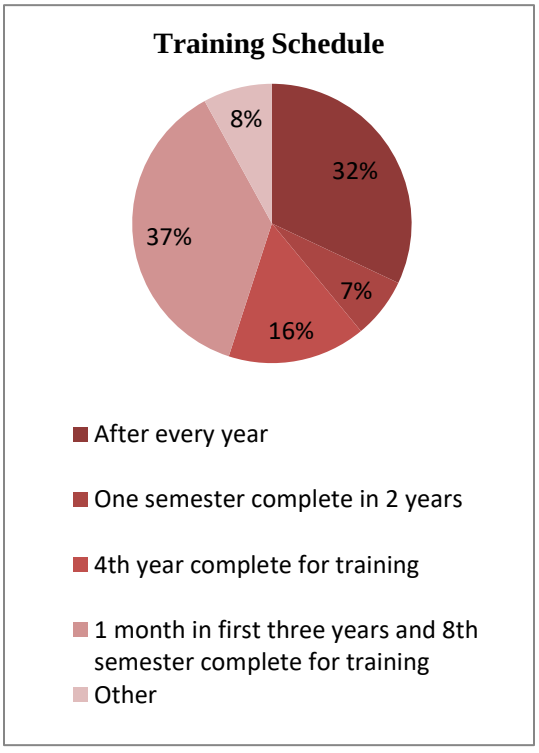
- A small project, related to every language or platform offered in the curriculum, can help students in developing their practical implementation skills.
- There should be an International standard setup for Computer engineering so that students, who have completed their graduation in India, have equal opportunities in other countries also.
- More emphasis should be given to boost interaction activities between students and IT firms.
- There should be a bound over the number of available seats in various private or public institutes so that bulk production of clueless engineers can be checked.
- There should be some criteria for selection of elective subjects. Institutes should not be free to select any subject of their comfort.

6. Conclusion



It can be concluded that syllabus of Computer Engineering in Indian Universities must be redefined to meet the changing needs of IT market. An international standard must be followed so that students graduated in India will be able to get admission in foreign Universities for post graduation courses. The regulatory body of technical and higher education in India must have to limit seats for Computer engineering in Universities and regulate the opening of new Universities and private institutes. Technical infrastructure needs more investment by Government and private bodies to boost research in this field. Curriculum of Computer engineering must be designed according to the global market and technological trends and reputed foreign Universities. The ratio of students per faculty member should have some upper bound so that teachers can effectively transform their knowledge to the next generation Computer engineers. Universities and institutes should design programmes for proper interaction between students and IT industry where they have to work after graduation. Curriculum should have proper activities for personality development programs parallel to technical subjects. Institutes should support workshops for regular training of teachers in new technologies in the field of computer science. Curriculum needs to have more focus on practical subjects for imparting required technical and problem solving skills to the students. Tie-ups with foreign Universities for students exchange programmes might be useful for better employability of Computer engineering students.

7. References

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