A STUDY ON THE EDUCATION ECOSYSTEM IN ENGINEERING INSTITUTIONS IN KERALA

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Abstract

A comprehensive survey among the management, teachers and students to understand the current environment pertaining to employability skills development, in engineering colleges across Kerala. The study was conducted in 75 engineering colleges across Kerala. For the study, samples of the top management from colleges, teachers with 2 to 8 years of experience and students studying in different semesters were taken for the study into consideration. The study was conducted to assess the teaching learning process, inculcation of experiential learning philosophies and the level of employability skills included as part of pedagogy. The survey exposed a few interesting findings from all the segment of population – Teachers are willing to adapt to new technologies in teaching; majority of them joined the profession because of their passion towards teaching. However, there are clear insights to suggest that quite a number of teachers are joining the profession with limited exposure to Industry or teaching, and hence their ability to impart the subject knowledge and with effectiveness has been a major limitation. The responses suggest that a lot of emphasis is given for additional learning in Govt. colleges, through TEQIP funding. Similar opportunity needs to be provided to Private Engineering colleges With regards to the findings from Students survey, a lot of students like their Engineering course and are willing to learn beyond their textbooks. Most of the students would like to seek a job after their studies and they are completely on, when it comes to usage of technology. They find peer learning to be effective and think that interpersonal skills are their biggest weakness for campus placements. All the segments of stakeholders are of the opinion that the college is providing the infrastructure facilities and majority of the students feel that Engineering has made a positive impact on them. It was observed that the teachers will need continuous training on Teaching/Learning process and Concept coaching skills. Also, educational institutions need to embrace technology enabled learning to make the education more holistic and inclusive. Course articulation should focus on Skill oriented experiential learning, to enhance student's fundamentals on engineering concepts. Introducing Employability skills as part of curriculum and making the curriculum more Industry relevant are the long-term measures Technical education segment needs to focus on. ICT Academy believes that Engineering education in the state of Kerala is under transformation, and most of the Institutions and the stakeholders recognize the important changes that are to be undertaking and are willing to adopt them. While the readiness of

education infrastructure is in place at least in many Private and Tier-1 Govt. engineering/ aided colleges, the general competence of faculty members is not standardized. A long-term strategic view from University & Management, combined with rigorous focus on the quality of Teaching and the admissions limited to only interested students, would see complete transformation in engineering education in Kerala.

Keywords: Experiential Learning, Pedagogy, Teaching Competencies, Employability

I.   Introduction and Background

The study conducted was comprehensive one among the management, teachers and students to understand the current education ecosystem in the engineering colleges across Kerala. The study was conducted in 75 engineering colleges across Kerala. For the study, samples of the top management from colleges, teachers and students studying in different semesters were taken into consideration. The study was conducted to assess the teaching-learning process, inculcation of experiential learning philosophies and the level of employability skills included as part of pedagogy. The following chapters will provide a summary of key insights derived from each of the stakeholders. The detailed study results based on the various questions posted to the stakeholders are attached as Part II of this report.

II.   Objectives of the Study
(i)   General objective

- The study was to understand the current educational ecosystem prevailing in the engineering colleges across Kerala.

(ii)   Specific Objectives

- To conduct a comprehensive study among the management, teachers and students to understand the current environment pertaining to employability skills development.
- To study to assess the teaching learning process, inculcation of experiential learning philosophies and the level of employability skills included as part of pedagogy.
- To understand on the student's attitude and likeliness to learn engineering subjects.
- To understand the role of management & teachers in improving the educational ecosystem of engineering colleges across Kerala.
- To provide valuable suggestions/ recommendations for implementing the best practices and thereby refining the educational ecosystem of engineering colleges across Kerala.

III.   Key Survey Findings & Observations
(i)   Use of Technology

The long-standing Govt. colleges and many reputed Private Engineering institutes have got sufficient infrastructure for meeting their needs (around 40% of the population). But a lot of rural Govt. colleges and other private colleges lack even basic infrastructure (such as stable internet connection). Our survey points out that 75% of teachers do not use technology aids for

teaching, due to limitations in infrastructure. Also, around 69% of Teachers said they have not tried online learning methods.

Interestingly our results from Students shows that 56% of students surveyed are happy with the general Institutional infrastructure. Students survey also reveals that 36% of Internet time is spent on study related additional learning.

Combinations of lack of infrastructure and acceptability of Technology as a teaching aid amongst teachers have limited the usage of Technology for Teaching process, even though we believe the current set of students in engineering institutions would be happy to adopt technology as an important learning aid.

(ii)   Teaching Competencies

In the field of Engineering, relevant experience in industry is an important benchmark for assessing teacher's ability to provide quality education to students. In our survey, we found that around 47% of teachers do not have any industry experience. The respective college management has reflected similar opinion about their teacher's average industry experience. While this is certainly an area of concern, we have also found that around 25% of teachers have over 5-years of industry experience. These teachers should play an important leadership role amongst the teaching community in grooming the new teachers joining the field.

Our survey finding amongst management, teachers and students revealed that teacher's attitude towards the profession is positive. Around 75% of management representatives said that, their teachers take pride in teaching. 67% of teachers also mentioned that they joined the profession because of their liking to teaching. 54% of students rated their teachers as Good.

Even though learning through online means is yet to pick up amongst teachers, our survey found that teachers get alot of opportunities to constantly learn and upgrade their subject knowledge and teaching skills. Around 88% of teachers surveyed said they undergo training for over 3 days in a year. Amongst the various trainings offered, around 68% of the training they attend is on teaching effectiveness and 57% of it is on subject related additional learning (since the teachers are given multiple options, the cumulative % can be beyond 100%).

One of the big ways of keeping abreast with engineering industry is to engage with Industry projects or consulting assignments. Our survey finds that around 31% of teachers have been associated with such assignments in their teaching career. On the teaching competencies, all stakeholders converge on a positive note and that can result in positive teaching experience to students. To translate it into consistent behavior, motivation and reward mechanism with constant monitoring and upgrades needs to be supplemented from the institutional management, Govt. and universities involved.

(iii)   Students willingness and attitude

Through a series of questions shared with management, students and teachers, we tried to measure the student's attitude to the institution, their subjects and overall feel about engineering studies.

For the question on students' interest levels, around 58% of management representatives felt that the interest levels of students in learning Engineering is at satisfactory levels. The teachers felt around 61% of their students like Engineering and 69% of students said they like Engineering.

One of the other areas measured amongst teachers and management was on their challenges and around 48% of teachers have indicated Students' attitude and their learnability as the biggest challenges in teaching the subject.

When asked, around 64% of students felt that their educational institution is making a positive impact in them. By introducing entry-level checks and by constantly appraising students on the great strides Engineering and Technology is making to humankind, it would be possible to improve the attitude of students towards Engineering.

(iv)   Teaching-Learning dependencies

The Teaching-learning dependency is a measure of innovative ways of teaching and learning of subject. As part of the survey, various responses on the multidimensional aspects of teaching-learning process were collected and analyzed.

One of the important finds by analyzing management, teachers' and students' response is that, Teachers and management still feel traditional teaching methods (lectures, Q &A session within class) are the best ways of teaching - around 78% of teachers /management believe students learn from teachers' notes. Only 19% of teachers believe that demonstrating a concept using small experiments will help students' learning process.

On the students' side, around 39% of students feel that listening to classes and reading notes are the best; however nearly 49% of students learn through peer group learning or through external means.

Teacher's ability to engage with students in the role of facilitator/mentor has been proven low from our survey. Only around 22% of teachers say they are comfortable in engaging students outside classroom. Around 64% of students indicate that teachers would limit their session to syllabus or even less than that.

Our survey reveals that the educational institutions are running traditional models of teaching. Even though the new generation students are willing to adapt to other modern means of learning, teaching processes are limited to classroom interactions. In the 21st century learning process, students obtain a lot of knowledge from many other channels other than teachers and hence it is more important for teachers to adapt to newer ways of teaching to be seen as value adding to students' learning process.

(v)   Institutional infrastructure

A multi-level analysis was done on the holistic development of students using the educational eco-system available in the education institutions. In our study, around 79% of students agree that the college provide them with a lot of opportunities in co-curricular areas such as technical festivals, engineering club activities etc.

On extra-curricular activities such as arts and sports, 73% of students have indicated satisfaction about institutional infrastructure in promoting such activities. Around 55% of students are happy with facilities such as library, canteen playground etc.

The overall results emerging in this section has been positive. The effective use of these processes and infrastructure will be critical for ensuring holistic development of students as world-class professionals.

(vi)   Engineering Curriculum & Subjects

There was spectrum of questions that were analyzed to understand the curriculum, pedagogy and overall Engineering subject learning (as well as teaching). There were a number of insights that emerged as part of changes suggested for curriculum. In the order of priority, Making subject 'current' and relevant to industry was ranked 1 by most of the teachers. Around 57 % of students individuated that their subjects need change. 22% of students want Subject knowledge training as part of employability training, indicating their lack of confidence in the subject knowledge.

From the Engineering management side, addition of employability skills training, experiential learning, higher industry-academia interaction is considered as vital changes to be made to the overall curriculum.

Nearly 42% of teachers responded that packed curriculum is the biggest challenge in imparting the subjects more effectively to students. Applying modern techniques in teaching such as flipped classrooms or using technology-enabled learning (that help students to learn flexibly beyond college hours) are ways of looking at improving the productivity of education.

The academic world feels strongly about making the Engineering discipline more industry oriented and are keen to adapt to such changes made at the university level. This is certainly good news for the newly formed Technological University, which is trying to make such changes to the Engineering discipline.

(vii)   Student Priorities after Engineering

The analysis across segment of stakeholders was nearly unanimous on the student's aspirations beyond Engineering. Nearly 72% of students would like to go for jobs after their graduation. Nearly 20 % of students wanted to go for higher studies and rest would like to venture into their own business. Even Teachers (69%) and management of institutions (86%) feel that students are highly oriented towards jobs. Interestingly the percentage of students aspiring for govt. jobs and private jobs are nearly in equal percentages.

The need for authorized experts for providing suitable career advice has come out evident, as more than 51% of students take career advices from their own friends; nearly 30% does self-research for making career decisions. When it comes to campus placement assistance and training, most of the students are worried about their soft-skills (32% of students are worried about GDs, around 34% on interviews).

Students of engineering are very worried about their ability to get employed due to lack of professional skills. Also, wrong career decisions are likely to be made by going through peer advice. Engineering colleges need to take lot of interest in helping students achieve their career dreams.

IV. Detailed Survey Data Analysis

(i) The Changes suggested for engineering education

(i) Proper filtering in Plus 2 – 5 - (A)
(ii) Redirect students who are ineligible for engineering studies - 2 - (B)
(iii) Experiential learning from first year onwards - 10 - (C)
(iv) More internships – 5 - (D)
(v) Make student employable – 10 - (E)
(vi) Industry oriented education – 8 - (F)
(vii) Long-term skill development programs – 8 - (G)
(viii)Soft skill development program from 6th semester onwards– 10 - (H)
(ix) More emphasis on new streams of engineering - 1 - (I)
(x) Closely connect with KTU – 2 - (J)
(xi) Maintaining quality of Teacher & Teaching – 8 - (K)
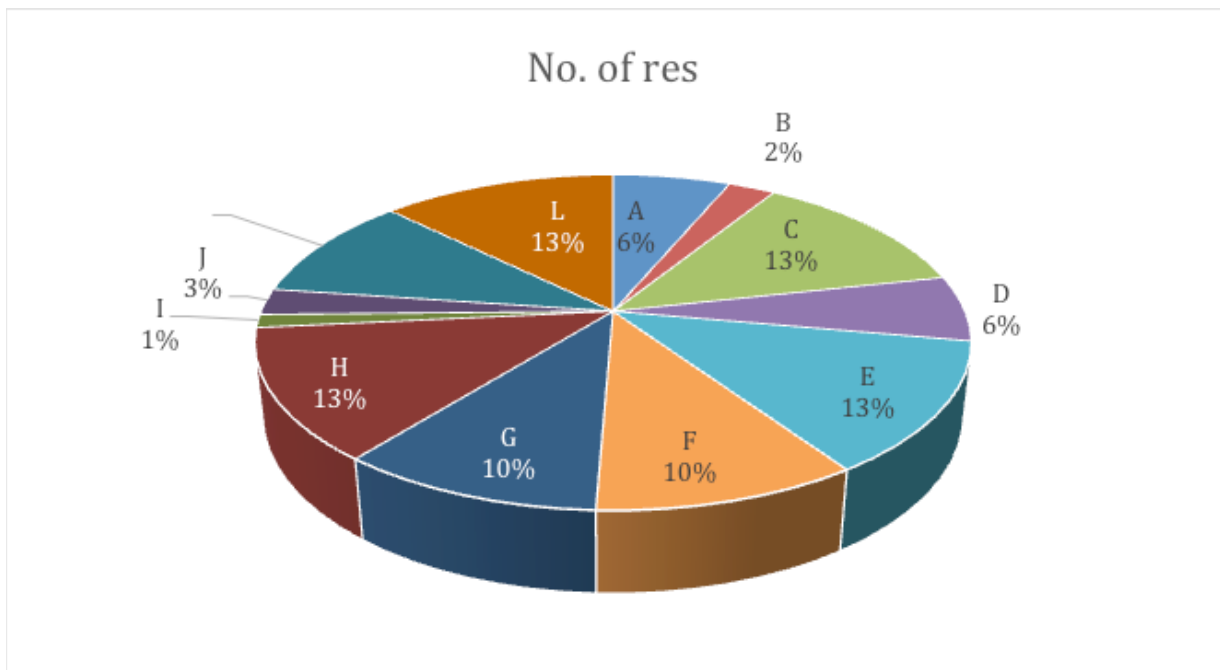(xii) More Academia – Industry interaction – 10 - (L)

Figure 1: Changes proposed for improving the quality of education

(ii)   Teachers opinion on improving engineering education system
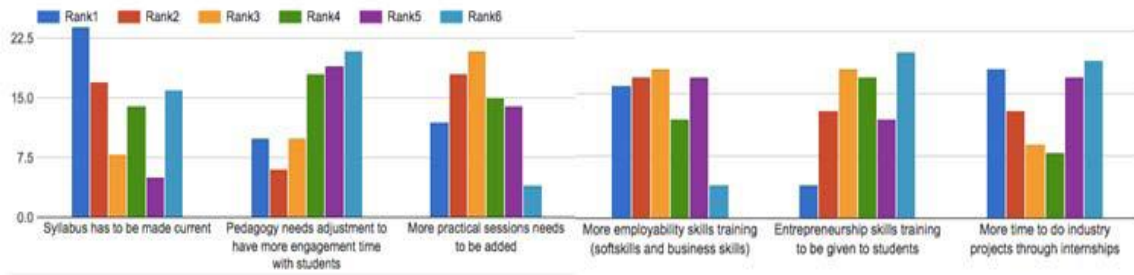

Figure 2: Suggestions for improving Engineering education

From the above figure, it is seen that lot of the teachers voted for Syllabus change. Teachers would like the syllabus to be in line with the industrial demand. The next option that got maximum votes was for the pedagogy adjustments with flexibility. Inclusion of employability Skills training as part of Engineering education was voted the next important modification to make.

(iii)   Various methodologies used by teachers in the class
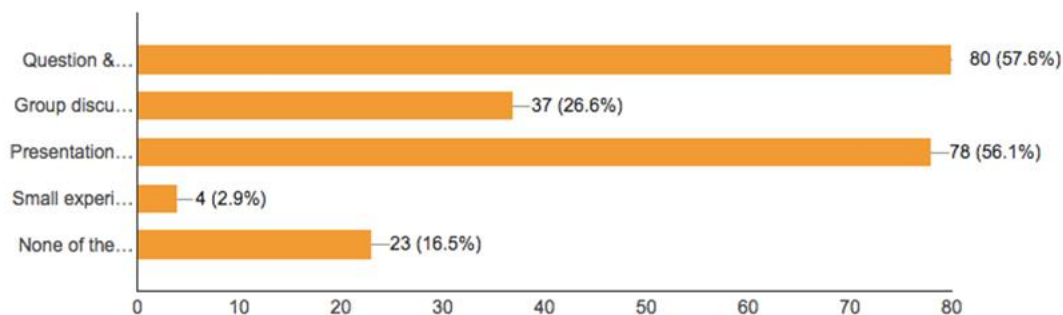
It is seen that 57.6% of the students opinioned that the teacher includes question and answering session in their regular class and 56.1% of students claimed that there were presentations and seminars in their regular class. Around 26.6% of the students indicated that there will be Group discussion as well in their classes and 16.55 of students were of the opinion that nothing will be there apart from normal lecturing. Q&A Sessions are quite important for validating the efficiency of teaching. However, for long-term impact of classes and for making students understand concepts very clear, it's very important that the teachers should include Q & A Sessions, Group Discussions and small experiments.

V. Key Conclusions

ICT Academy observes that fundamentals of engineering ecosystem are fair in the state. In some cases, the implementation lacks focus and in other cases, short-term gains are driving the ecosystem. On the specifics, we feel that teachers play a vital role in the improvements and hence will need continuous training on Teaching/Learning process and mentoring/coaching skills. Also, educational institutions and teachers need to embrace technology enabled learning to make the education more holistic and inclusive.

Course articulation should focus on experiential learning, strong foundation on engineering concepts and its application using real life scenarios. Introducing Employability skills as part of curriculum and making the curriculum more Industry relevant are the long-term measures Technical education segment needs to focus on. Students need to take advantage of Internet channel for gaining subject knowledge, in addition to the conceptual knowledge gained in classrooms.

A more collaborative ecosystem involving all the stakeholders including industry needs to be developed to make engineering education more relevant to the current time. Apart from looking at intake quality of students based on aptitude, a suitable mechanism to assess the student interests would lead to more engaging classrooms in engineering colleges. Faculty members need to participate in industry projects and take pro-active steps in knowing the changing trends in the engineering field. Due to its affiliation to multiple universities, engineering colleges in the state has differing operating standards and it hampers uniform deployment of educational reforms. Consolidation of engineering education under newly formed Technology University is an important step that will help in this standardization. Introduction of courses such as Design Engineering, Life-skills learning, new generation programming languages such as Python, introduction of practical oriented teaching from year-1, are some of the steps taken in the right direction by the Technological University in Kerala.

We are very optimistic about the future of engineering education in the state. With the continued growth of technology, engineering discipline will enjoy its high importance status in the coming decade as well. An ecosystem for the holistic development of future professionals with industry relevant skills are not a far stretched dream, but an achievable target in the near future!

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