ACADEMIC STANDARDS IN ENGINEERING COLLEGES

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Academic standards are the result of the interplay of several different components, although, the ultimate measure of the standards of any institution in particular is the academic excellence of the students passing out of the Institution. To produce a good standard, it is necessary that the standard of the students admitted to the institute be good, the course content be revelent to the needs of the industry, the aids and equipment used for teaching have a standard, and above all , the teachers be motivated, and the management be sufficiently intrested. We may imagine that there is a level of each of these components above which the individual components will be mutually strengthrening each other and below which there could be mutual weakeining and degradation.

Let us trace the development of each of these components in detail:-

1. The standards of the student input and their motivation to excel :

In the early post independence period of the 50's, Engineering Colleges were few and far between, and Engineering had not gained that much of popularity. Only those with high academic background, good ability in Mathemetics and Sciences, and those who were keen on pursuing an Engineering career were taken into Engineering Institutions. They did reasonably well and had a good standard when they passed out.

The situation obtaining at present is that there exist a number of Engineering Colleges, and there is a lot of parental pressure on children to take up Professional Courses -Medicine and Engineering. Proliferation in Medical Colleges has not taken place as much as in Engineering Colleges and thus it is easier to try to secure admission in Engineering Colleges by merit, or by money. At the time of admission, a sort of natural selection takes place, good Institutions get good students, while mediocre Institutions tend to get mediocre students only. It is a sort of vicious circle, tending to maintain the good institutions good and mediocre institutions mediocre. To get out of this, the mediocre Institutions will have to improve their other components to a much greater extent.

2. The curriculum content of the Courses:

When I graduated in the 50's the content of Electrical Engineering under graduate curriculum was but a fraction of what it is today. We never studied Laplace transforms, nor did we study any serious Network theory, nor Electromagnetic theory and Maxwells' Equations. All we did was a bit of electrical machinery, measurements, switch gear and utilisition. Nothing about Power system stability, Power Electronics, Sytmmetrical Components and short circuit studies, Control systems or application of Computers to Power system studies. Some of the Technologies mentioned here were not even evolved. Having thus, a limited

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curriculum, we had all the time to go into the depths of subject and learn it. The teachers who taught us had also used the same books which we were using, the subjects were all established with standard books and there was a maturity of approach to these subjects. Somewhere around 60's and 70's came a situation, where several new technologies were developing, and at job interviews questions were being put of the type :

"Have you heard about V_MOS transistor or I2L technology ?" If the candidate says he has, it would satisy the interviewer, for it was so happening that he has also just heard about these technologies, beyond that he would not question and the candidate would not be required to know seriously anything about these. Such occurences led to a situation which encouraged the inclusion of almost everything about the developing technologies under the name of modernisation of Syllabus. The topics were raw, and poorly defined, not enough books of a mature quality were available, not were there enough teachers who understood what they were teaching, well enough to create interest in their topics. Unfortunately, a drift from depth to width was inevitable. The syllabus became voluminous and appreaciation of the subject become secondary, memorising became the primary measure of learning. The situation now is vastly better, as several technologies have attained a degree of maturity, standard books have been written and are available. However, the large body of topics that Engineering Undergraduates must learn before they are thorugh with this course, is still the major factor that comes in the way of their attaining deeper proficiency in it.

3. The aids and equipment used :

In the 50's the Course content, as we had already indicated, was well defined and so were the equipments and experiments to be done by the students. Most of the laboratory courses were fully defined, the experimental set ups were also well tested. As the Engineering curriculum started expanding to include many recent developments, the experimental requirements of the courses also became increased, and to some extent ill-defined. The laboratory facilities depended more and more on the initiative of the teachers and the policy of the management of the institutions,, so much that now in the nineties we find several institutions not having adequate facilities in the laboratory. in some situations, equipments supplied went out of operation in a year or two. and would not be set right thereafter for various reasons. Such equipments were kept in the lab. for the benefit of the University Inspection Committee, but were not available really for study purposes. While industry use of several such equipments like microwave systems, was developing at a rapid rate, it turned out that experimental work in such fields in the laboratories of Engineering Colleges was languishing Industry found imported techology in serval advanced fields very much useful, but Colleges could not give hands-on training in many of these fields, for the imort of such equipment and their maintance involved financial outlay at a level which many Colleges could not afford. A gap between industry and education institutions was thus developed and in-house training of fresh engineering graduate recruits become more and more necessary, leading to-a-feeling in the industry that the standard of the students of engineering Colleges is going down.

4. The Teachers :

If we go back to the 1950's, it can be seen that Engineering Colleges were few, and in comparision to the tehn employers of engineering graduates - namely the Public

Works department, Electricity department and the like, the College teachers were paid well. As a result, reasonably good engineers were taking to teaching profession. Later on, with the growth of industrialisation, engineers could get well paid jobs in industry which prompted the establishment of a number of Engineering Colleges. Simulutaneously, the need for more teachers become felt. However, those who could get jobs in industry preferred to work in industry, and relatively lower ranking graduates joined the teaching profession, where the pay was not perhaps as high. The relative abudance of vacancies in the teaching line at the time and the absence of any accountability for the teachers, killed all motivation that these teachers might have had to improve theemselves and march towards excellemnce. It is only recently that AICTE has laid down some norms, like every teacher must have attended a certain number of refresher courses/summer/winter schools and so on to merit a promotion. The duties and adequate responsibility is placed on the management to help the Staff to development themselves by way of higher studies, purchase of books etc. It is hoped that these measures, will bring in a general improvement all round.

5. The Management :

The management associated with some of the self-financing institutions, started these institutions, possibly as a business proposition, and were not seriously intrested in developing the Colleges. The laboratoriers were ill-equipped and inadequately staffed. However, they soon found out that such a step would not pay, and slowly but surely, there was a general improvement . in these Colleges. The process of natural selection was aided by the external forces like the AICTE and the University Inspection Committees, and currently it is seen that the management is interested in improving the standards on their own.

6. Conclusion :

It is thus seen that among the various components that tell on the standard of an institution, the first; namely the standard of the students being admitted to the Engineering College can improve only if an all round effort is done by the College to improve the other factors. The Staff, the equipment, and the management attitude towards the College, all must improve. The vicious cycle of poor quality student output causing again poor input, could be broken if and only if the image of the College gets a lift all round. The lift must be such as to produce a reasonably good student output even with a relatively low quality student input. It can be seen that the effort required has to be much more than the effort mustered in these directions by the better Colleges, as these better Colleges can produce good student output more easily by virtue of good students inputs. The task is enormously hard, but unless such an immense step is taken, institution of lower standing will keep going lower still.

It may not be out of place at this point to indicate that a certain depth must be reached in every topic that is presented to a student. Although the curriculum indicates a breadth of knowledge, some effort must be made by teachers to put in a depth of understanding. The way a subject is taught, and the way it is examined, must be conductive to create a serious interest and foster this interest. Today, in several fields, the industry leads the Engineering institutions, and the students must be adequately exposed to this. Adequate exposure of the staff to the industry, and also some training of the student in industry, as least during the third and final year of the course might improve the situation and help reduce the gap between

the college and the industry. Adequate training to the staff, to empasise on the motivation of certain industrial practices, and theriotical derivations, rather than mere recitation of these practices and derivations, would go along way in in creating the depth of understanding. The teaching must change from narration to critical examination of facts and policies. Thinking must be provoked, and memorising must take a back seat in actual practice of teaching and evaluation. As it exists at present, Engineering teaching is perphase the only profession in which an Engineering gratuate can start on day 1 after his degree.

Everywhere else, the graduate has to undergo training. A method has to be evolved to make depth compatible with breadth in a short ime. The task is aagian enoromous, and in the absence of training, every conscientiion, and do the best he can. Paricularly, he should not kill the curiousity of the students, by giving them a collection of statements of facts and expecting them to memorise. Appropriate attitiude must be built into his teaching and evaluation, to reflect this philosophy as much as possible.

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