

## THOUGHTS FOR EDUCATIONAL REFORMS IN UNIVERSITY AFFILIATED ENGINEERING COLLEGES

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### ABSTRACT

*This paper proposes ways and means to double the admissions capacity of University Affiliated Engineering Colleges (UAECs) without any significant additional investment in infrastructures. Double semester admission would create eight active semester batches which will incorporate repetition and learning to faculty members and reduce throughput time of convocation to six months. Doubling the teaching capacity of the UAECs is a reality if external examinations and non-teaching jobs are replaced by internal periodical examinations. The listening periods of the students can be reduced from 39 periods per week to 22 periods. So a new work culture can be introduced through student assistant jobs, part times jobs and vacation jobs. Since 95% of Indian Engineering Colleges are UAECs, the application would benefit the nation. Further quality of education and socialization can be enhanced through Student Gandhi Grams (SGGs). University, All India Council for Technical Education (AICTE), Directors of Technical Education (DTE) and UAECs may be given new productive role to construct modern society by eradicating the evils in our society. This can be the "Revolution in Engineering and Technology Education".*

### INTRODUCTION :

In India UAEC students are not learning subjects of their choices and are bored due to 39 periods of classes per week for 13 weeks in a 26 weeks semester and are not having opportunity to take up part time student assistant jobs to learn work culture and earn money. Society at large and parents in particular do not believe in dignity of labour.

Sweating and toiling by the youth is prevented, thinking that it is the vocation of the lower classes. Education is meant to create an upper class which will not toil and sweat. Manual work which is the spring board for vocational education is neglected. Swami Vivekananda, who wanted to build a nation out of the people of this sub-continent, wanted the youth to have muscles and

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nerves of steel but students neglected sports, games and body building. Defects were added to University Affiliated Engineering Education (UAEE) when semester was introduced by failing to incorporate internal examination and evaluation is UAECs. As a result, interactive education was reduced to 13 weeks in 26 weeks long semester. Admission only in June in a double semester per year courses wasted the admission capacity of December. Teachers wasted 50% of teaching period in non-teaching jobs and lost semester repetition and learning curve benefits. So Indian UAEC faculty members became inferior teachers of the world.

Increasing admission to professional courses for bringing down the disparity in income of higher professionals and others can be done by reducing educational cost and expanding admission capacity to market demand so that admission can be given to any one without restriction for any course. Let market forces equalize wage levels for all professions so that caste based reservation can be replaced by economic status based fee structure. Educational costs can be reduced if AICTE and UGC pay scales and norms can be correlated to per capita income of the land. University Affiliated Engineering Colleges (UAEC) can build student Gandhi Gram (SGG), to provide echo-friendly life in simplicity. Directors of Technical Education can establish cost reduction techniques in Government University Affiliated Engineering Colleges (GUAEC) to bring educational cost on par with Private University Affiliated Engineering College (PUAEC). Let university plan quality

assurance and establish, a section in every college for admission, grade recording, grievance cell, course knowledge banks and abolish syllabus committees. Let all examination be periodical internal tests conducted by course givers. Change the traditional role of AICTE, DTE, University and UAEC so as to create affordable mass education and for destroying caste and religious barriers to build a homogenous nation. Create better conditions in India so that Indian students will not emigrate to overseas institution to seek better education.

#### **GOVERNMENT UNIVERSITY AFFILIATED ENGINEERING COLLEGES (GUAEC) ARE RUNNING IN LOSS :**

One of a GUAEC with an admission capacity of 150 students per batch required the investment of 150 million rupees (non-recurring). Assuming 12% interest and 4% depreciation and maintenance, the interest charges plus depreciation and maintenance cost per student year in GEC Rs. 40,000/-. College operating cost was 15 millions per annum (recurring expenses). Operating cost per student year Rs. 25,000/-. Total cost per student year Rs. 65,000/-. But Government collected an annual fee Rs. 6,500/-. As government did not have funds, it opened out UAEC to private sector. In private sector Dr. S. H. Ibrahim, The Founder Principal of MSEC Kilakarai established UAEC with 8 Under Graduate (UG) and 4 Post Graduate (PG) courses with a total batch size of 500 just with 75 million rupees and reduced the cost per student year even under the single admission system to Rs. 18,000/-. Why the people who

manage Public Sector Undertakings (PSUs) cannot be as good and as much dedicated as Dr. S. H. Ibrahim for reducing investment so that Engineering Education (EE) can be given to larger number of students to create social change. There are only 6 GUAEC compared with 125 licensed Private University Affiliated Engineering Colleges (PUAEC) in Tamil Nadu (TN). It is a proven fact that Indian Government failed miserably in managing its PSUs and educational institutions. Socialism has failed in India due to lack of dedication by failing to have proper national goals. Indians are still an immature society and it is proved from the fact that 35% of Swedish jobs are created by PSUs while India is disinvesting its PSUs. India has the capable people but PSUs management and recruitment policy lacked proper

national motivation and goals. So India needs social changes in managing its educational institutions.

### INDIA IS POOREST NATION WITH COSTLIEST EDUCATION :

The per capita income is 28,020 dollar in USA while it is only 360 dollar in India (1996) which is roughly Rs. 14,400/- per annum. At present 35% of the Indian parents are under poverty line and another 30% lower middle classes who will not be able to spare money for higher technical education of their wards. Indian educational costs in terms of per capita income are many fold higher in comparison with per capita income of USA where a year of study costs only 50% of its per capita income. The Indian educational cost factors are given in Table 1.0.

**Table 1.0 Current Educational Expenses for Management, Government and Free Seat.**

| Item                 | Management Seat<br>in Rupees | Government Seat<br>in Rupees | Free Seat<br>in Rupees |
|----------------------|------------------------------|------------------------------|------------------------|
| Capitation Fees      | 300,000 to 20,000            | NIL                          | NIL                    |
| Annual Fees          | 45,000 to 32,000             | 37,500 to 37,500             | 9,500 to 8,400         |
| Room Rent            | 10,000 to 3,600              | 10,000 to 3,600              | 10,000 to 3,600        |
| Mess Bill            | 10,000 to 4,500              | 10,000 to 4,500              | 10,000 to 4,500        |
| College Bus          | 4,000 to 1,500               | 4,000 to 1,500               | 4,000 to 1,500         |
| Books                | 3,000 to 2,000               | 3,000 to 2,000               | 3,000 to 2,000         |
| Day Scholar Per Year | 127,000 to 40,500            | 44,500 to 41,000             | 16,500 to 11,900       |
| Hostel Cost Per Year | 143,000 to 47,100            | 60,5000 to 47,600            | 32,500 to 18,500       |



In India irrespective of ones economic background all college boys and girls are forced to lead the same upper class life style. The existing system did not offer opportunity to the motivated youth to become economically independent by taking up part time jobs or by living in Student Gandhi Gram (SGG). In India education based social reforms for eradicating parental dependencies are not planned.

#### **AICTE, UGC AND LICENSING AUTHORITIES ONLY BOOSTED TEACHING COST OF EDUCATION :**

AICTE and UGC pay scale and regulations in the pretext of enforcing quality education increased educational cost beyond the means of common man by making it many fold larger than per capita income. The bureaucratic licensing system further boosted the cost of education and restricted admission capacity below market demand. So Indian AICTE UGC and licensing authorities cannot have any excuse for their failures. India pays exorbitant salary to its teaching faculty members, whose academic expertise such as ability for setting their own syllabus or competency and reliability to set question paper or conduct examinations or correctly evaluate the answer papers without bias had not yet been recognized even by their university.

AICTE and University used up the privileges conferred on them to enjoy red carpet welcome from private University Affiliated Engineering Colleges. They are increasing the cost of education and are a stumbling block for creation of affordable education for all those who demand it. Country like India require a plan for affordable mass education in engineering and technology. But they did not explore the possibilities for spreading mass education to establish an industrial society but created a costly and most difficult educational pattern which could only be suiting to by the high academic achievers who are usually of upper castes while country like Sweden provides educational systems which will increase productivity and skill of even low academic achievers since all children born in a nation cannot be academically brilliant.

#### **WHEN LICENSING CAN HELP A NATION ? :**

Licensed education can be beneficial only when institutions are planned on economies of scale to reduce overhead cost, teaching cost and boarding and lodging cost of students. A licensed system will make it mandatory for college to run in shift by incorporating for colleges to run in shift by incorporating double admission per year to double the intake and provide language bridge

Table - 2

| Comparison of salary structure of teaching faculty member in                   | USA       | India  |
|--------------------------------------------------------------------------------|-----------|--------|
| Salary of teaching faculty members in terms of per capita income of the nation | 1.4 - 2.8 | 6 - 20 |



courses for those who studied up to +2 in vernacular language. Then it will have to double the present college teachers teaching time by incorporating internal examination and evaluation by canceling external university examination and evaluation. Start Student Gandhi Grams to provide training on Gandhian simplicity and provide affordable boarding and lodging along with eco-friendly life to students.

Government shall create openings for all those who seek admission by creating larger admission capacity and reducing educational cost to affordable level. Students may be encouraged to choose food and accommodation according to their economic background. The author's market survey showed that one could get a breakfast for Rs. 5/- to Rs. 25.0/-. Accommodation can be got for Rs. 50/- to Rs. 1000/- per month. Choice of accommodation and food may be left to the student. If listening times are reduced and if students are offered work scholarships to make them self reliant then it will create a class of daring and independent youth with enormous generation gap who will evolve rapidly to cross caste and religious barriers and parental dependency to establish the industrial society for making India a super nation.

#### **EDUCATION FOR ESTABLISHING INDUSTRIAL SOCIETY AND FOR CREATING SOCIAL CHANGES ARE NOT PLANNED :**

Japanese Maiji revolution abolished caste based society and directed people to take up specific tasks. Government may plan to create affordable, easier and

interesting engineering education as the first step for creating an industrial society by creating social changes for building a homogeneous nation by cracking barriers of caste and religion. AICTE need not impose an expensive education in all institutions which will be beyond the means of the common man who will not migrate to advanced countries, and shall not ignore the fact that the per capita income of India is less than 1.4% of USA. University Affiliated Engineering Colleges need not prevent interaction of adult boys and girls to assist the society to rigidly hold the caste system and the religious barriers. DTE may select social goals or objectives such as reducing educational cost in par with PUAECs. So Government may propose a national policy on education to create social changes through educational reforms for establishing a homogeneous industrial society for it is of higher evolution than caste ridden superstitious farming and handicraft society.

#### **COLLEGE EDUCATION IS DEFICIENT AND DID NOT DIFFER FROM SCHOOL :**

The analysis of student activity during a week in UAEC showed that it consisted of 39 periods of instructions and model lab activities for 13 weeks out of 26 weeks of a semester as it was followed in school. Students hardly took up body building like American students. Students rarely participated in sports and games and could not build muscles to get medals in Olympic Games. Due to lack of repetition, faculty members became poorer in subject specialization and lacked expertise. Interac-

tive education with condensed teaching and periodical examination will alone create good education and college life.

### **THEORY X MANAGEMENT, FIXED SYLLABUS AND UNIVERSITY EXAMINATION :**

During the British rule, Mac Gregor's theory X management suitable to a colonized people was applied in India. Responsibility for syllabus setting, printing question papers and correcting answer paper was vested with university. Students wait 3 months for results. Academic initiative and innovations were suppressed by fixed syllabus based courses. University examinations were thrust on colleges. Faculty members and administrators were not trusted. University became an examination conducting body which took away academic freedom by imposing fixed syllabus and reduced interactive education by imposing university examinations.

### **INEFFICIENCY OF SINGLE SEMESTER ADMISSION AND SINGLE LEVEL COURSES :**

After experiencing two decades of self rule, India switched over to semester pattern but failed to incorporate its economic and technical features. They are still combining first two semesters as first years course and it increased the throughput time of convocations. As a result Indians are unable to conduct half yearly convocations in UAECs. Odd and even semester course of 2nd to 4th years are conducted with six months interval and are not offered simultaneously. India offers only single level engineering courses while Bradley offered multilevel

Engineering and Technology (E&T) courses. Indian students are compelled to study what was offered by the college semester package and so it turned out to be half yearly compulsory education suitable only to high academic achievers. It did not offer technology courses which are likely to be easily learned by low academic achievers or lower castes. The pattern compelled colleges, to follow odd semester courses in the first half of the year and even semesters in the second half of the year and conducted single convocation.

### **50% OF SEMESTER WEEKS ARE WASTED ON NON-TEACHING JOBS :**

The educational analysis of each semester proved that interactive education was imparted during the first 14 weeks out of which one week period was lost on holidays. Indian teachers are prevented from continuous teaching by introducing non-teaching jobs and by changing from odd to even semester subjects. So it inculcated inefficiency in lecturing in comparison with Bradley professors and so Indian students preferred to go for examination without attending lectures. Semester teaching service of the UAEC per branch of study such as mechanical engineering was  $39 \text{ (periods / week)} \times 13 \text{ (weeks / semester)} \times 4 \text{ (batches per branch)} = 2,028$  periods while the potential capacity was  $22 \text{ (periods / week)} \times 23 \text{ (weeks / semester)} \times 8 \text{ (batches)} = 4,048$  periods. Faculty members taught only for 50% of employed time and spent rest of time in non-teaching activities. Increasing productivity in teaching will cause greater social changes. So let Universities cancel

external examinations and enforce internal periodical tests and increase interactive education to 23 weeks in 26 weeks semester. Entrust teaching faculty with the responsibility and authority for teaching their best courses. Establish knowledge banks to develop educational technology and syllabus committees. To initiate these changes in each UAEC, establish one university section to take up direct admission, grade recording and for noting complaints etc.

#### **LACK OF DOUBLE ADMISSION PER YEAR CAUSED HEAVY LOSSES:**

UAECs did not admit students in December semester and did not incorporate language bridge courses. So, UAECs are unable to teach simultaneously odd and even semester classes to achieve economic and technical benefit of semester system. It caused the greatest loss not only to engineering education but also to all semester based education in India. Such academic mismanagement should not have been committed in a planned economy by the intelligentsia. For a 4 year course, if admission to UAECs are taken up in June and December as at Bradley it will create 8 consecutive semester batches of classes. Every six months students will complete semester courses and move to next higher semester. Semester batch lectures will be repeated every six months. It will repeat its time table every six months. The same faculty members will repeat the same classes. There will be no need to prepare time tables three times a year. As the faculty members will repeat lectures every six months they will gain from benefits of division and specializa-

tion as well as learning and repetition. Then Indian lecturers will be elevated to the ranks of professors if they are assisted by students and are provided access to journals, lab practical, software and latest text books in that field. Then Indian academicians can compete with Americans and their international professional status will be boosted up in world community.

#### **50% OF ADMISSION CAPACITY WAS WASTED :**

Institutional admission capacity was reduced by 50% by not admitting students in December. As the overhead cost of education became 70% of total educational cost, admission only in June semester made education expensive. Bradley introduced a December admission to double the admission capacity and increased student intake and further incorporated E & T courses suitable to Engineers and Technologists to widen the choices for students. This was done through the four level courses. But Indian upper castes permitted only single level engineering courses alone as a result only students of upper caste or high academic achievers of lower castes were able to study engineering. To spread engineering education to lower Hindu castes as well as low academic achievers of upper castes, double admission per year, language bridge course and four level courses are required. Government may direct university to do the necessary changes. Those changes will double admission capacity, reduce college fees and enable poor people to take up UAEE even without reservation and make it easier for low academic achiev-



ers to learn Technology.

### **COST BENEFIT ANALYSIS OF DOUBLE ADMISSION PER YEAR OVER SINGLE ADMISSION :**

The author had observed the suffering of Indian parents for not following single child family norm. Higher birth

rate created parent dependent student population. So an investigation was carried out to identify the educational cost factors and their values in single admission per year and for the proposed double semester admission engineering education. Refer to Table 3.

**Table 3 Comparison of Educational Cost Percentage for Single and Double Admission in EC.**

| Sr. No. | Item Comparison | Single Semester |            | Double Semester Proposed |            |
|---------|-----------------|-----------------|------------|--------------------------|------------|
|         |                 | Cost            | Percentage | Cost                     | Percentage |
| 1.      | Overhead Cost   | 14,105/-        | 70.0%      | 7,052/-                  | 35.0%      |
| 2.      | Teaching Cost   | 4,150/-         | 20.6%      | 2,075/-                  | 10.3%      |
| 3.      | Other Costs     | 1,895/-         | 9.4%       | 1,373/-                  | 6.0%       |
|         | Total           | Rs. 20,150/-    | 100.0%     | Rs. 10,500/-             | 51.3%      |

Double Semester admission and double shift system of the proven Madurai TVS school technique and internal periodical examination instead of university examination will reduce educational overhead cost by 35%, teaching cost by 10.3% and other cost by 3.4%. So a much larger parent population can send their wards to UAEC as a result low income parents' children will also attend UAECs.

### **SHIFT COLLEGE WILL REDUCE TEACHING COST BY 50% AND CREATE SOCIAL CHANGES :**

To achieve the benefit of double admission per year, one shall operate shift college and cancel non-productive, non-teaching jobs and stop external university examinations. Then if the teach-

ing faculty members are provided with academic authority and responsibility, extend interactive teaching from 13 weeks to 23 weeks in a 26 weeks semester and conduct internal periodical examination. Then sedentary listening periods of students will reduce from 39 periods per week to 22 periods. So odd semester can be taught in FN shift and even semester can be taught in AN shift. Same staff will teach simultaneously for odd and even semester students. This will double the number of students taught and double productivity in teaching. But daily teaching periods will be unchanged while daily listening period of students will be 200 minutes for 3 days a week and on practical days increased to 250 minutes per day for 2 days a week. So students will find time

for part time employment to earn money and at the same time teaching cost will drop by 50%. As a result a larger population of Indian students will be able to earn by part time employment to pay for UAEC courses. A decade of KAIZAN programme will improve course content and reduce maximum listening time to 150 minute per day. Government may direct university authorities to implement this programme. Then student will find time for sports, games, body building, part time employment and dating. Youth will become independent and self reliant. All can pursue higher education on their own initiative and select their life partners without the influence of parents. Then it will create social changes to create homogeneous nation without caste and religious barriers.

#### **THEORY, LAB PRACTICAL AND SOFTWARE ARE NOT INTEGRATED :**

In UAEC courses, theory is a separate subject and lab practical is a different subject. Software have not yet become part of syllabus. They are all taught by different lecturers. None of the lecturers had the complete expertise on lab, theory and software application. The integration is a must to teach a holistic professional subject. UAEC laboratories absorb 55% of capital investment of the UAEC. But they are used for 6 hours per week for 14 weeks in year. It is a poor utilization. If theory, lab and software are integrated along with double semester admission per year then labs will be used day in and day out like Bradley. Then only UAEC labs will be of any use. To undertake these changes university may demand double

semester admission and enforce curriculum changes.

#### **LACK OF LANGUAGE BRIDGE COURSE :**

Students who learned in vernaculars up to plus two level and who lacked adequate vocabulary in engineering, technology and scientific terminology are directly admitted into English medium EC course. If double semester admission is approved then the second admission batch which will start engineering courses in December can undergo language bridge course during June - December waiting time. This will help lower class children since rich parents send their wards to costly English medium schools. Further English medium courses may also be taxed since they may immigrate to over seas.

#### **INEFFICIENCY IN INDIAN ENGINEERING EDUCATION :**

Bradley university is a top ranking private self financed teaching university is USA. In Tamilnadu self financed private University Affiliated Engineering Colleges are 125 compared to 6 GUAEC. So the comparison of educational parametric indexes of Bradley will help to discover the backwardness in managing University Affiliated Engineering. PUAEC can become like Bradley if they have academic freedom and know-how to set holistic syllabus incorporating the combination of theory, lab and software to offer Fundamental level (100), Technology level (300), Engineering level (400) and Graduate level (500) courses, along with internal examinations and evaluation.

Table 4 : Comparison of Educational Parameter Indexes.

| Sr. No. | Item of Comparison for UG Courses   | Bradley     | Indian EC   |
|---------|-------------------------------------|-------------|-------------|
| 1.      | Teaching days per year              | 235         | 130         |
| 2.      | Teaching periods per week           | 10 (75 mts) | 40 (50 mts) |
| 3.      | Teaching minutes per week           | 750         | 2000        |
| 4.      | Teaching minutes per day            | 150         | 400         |
| 5.      | UG courses for degree               | 40          | 54          |
| 6.      | Teaching minutes for UG degree      | 111,000     | 202,800     |
| 7.      | University lecturing hours per week | 67          | 40          |
| 8.      | Laboratory use hours                | 168 / week  | 6 / week    |
| 9.      | Computer lab availability hours     | 168 / week  | 6 / week    |
| 10.     | Library hours per week              | 150         | 50          |
| 11.     | Multy level courses                 | 4           | 1           |
| 12.     | Semester per year                   | 4           | 2           |
| 13.     | Examination                         | Periodical  | Final       |
| 14.     | Evaluation                          | Internal    | External    |
| 15.     | Entry admission                     | June & Dec. | June only   |

#### NEW ROLE OF DIRECTOR OF TECHNICAL EDUCATION :

A society cannot live beyond its means. One cannot sell goods or services below its cost price for ever. So let DTE estimate the actual cost of education in government institutions and collect statistics of fees per subject per semester, hostel rent and mess bills. These data may be collected for every institution in the state and publish. Each institution

may be allowed to pay market salaries to faculty members and need not be compelled to pay higher salaries. Just higher pay alone did not make dedicated professors. Those who served mission institutions were paid much lower than AICTE pay scale but were proved to be dedicated. Neither highly paid government professors nor Government bureaucrats proved to be as much dedicated as missionaries or freedom fighters.

**COST ESTIMATING METHODOLOGY :****A. The Overhead Costs :**

Estimated from the following :

- (i) Add total capital investment on land, buildings, equipment, furniture, etc., and estimate capital cost at 12% of total capital investment.
- (ii) Annual campus maintenance expenses, depreciation, major repairs to equipment, vehicles etc., be actual cost or may be charged at 4% of capital investment.
- iii) Pay of Principal, management staff, security services, taxes paid to local authority etc. actual expenses.

**B. The Teaching Cost :**

They are :

- (i) Salaries and wages of teaching and non-teaching faculty members.
- (ii) Academic cost of seminars, guest lectures etc.
- (iii) Library purchase, periodicals, news papers, video films, slides, teaching aids etc.
- (iv) Examinations and evaluation expenses of students.
- (v) Class room maintenance.

**C. Other Costs and Consumable :**

- i) Consumable in labs and stationary in admission.
- ii) Power consumption excess over overhead level.
- iii) Festivals and functions.
- (iv) Cost of publications such as thesis printing, advertising etc.
- (v) Fuel and minor repair expenditure of vehicles and equipment.

- (vi) Garden and campus maintenance.

**LIBERALIZE LICENSING SYSTEM FOR E AND T EDUCATION :**

The licensing and permitting bureaucratic arm of the Government of India which controlled Indian Commerce and Industry had collapsed the Indian economy. Then finance minister Manmohan Singh canceled license method and opened the economy globally to revitalize Indian economy. Liberalize the licensing function since AICTE and University had failed to create affordable easier and enjoyable mass education in engineering and technology. And it is proved from the fact that even after 50 years of self rule, the admission rate in Tamilnadu with the largest number of University Affiliated Engineering Colleges is only for 3% of children born in a year which is a shameful record while between 1862 - 1902 Japan had increased literacy rate to 98% even by teaching 2300 characters compared to 247 characters in Tamil and industrialized Japan in par with the West for which European took 175 years.

**CONVERT GUAEC INTO GANDHIAN UNIVERSITY AFFILIATED ENGINEERING COLLEGE (GUAEC) :**

Socialism is failing in India. So controlled capitalistic techniques may succeed. It is the duty of any good government or society to provide appropriate and affordable education for rich and poor. It will be the first step in creating capacity to cross the class barriers and create social changes. Government may transform all GUAEC into Gandhian University Affiliated Engineering Col-



lege (GUAEC). Let all new appointees to GUAEC be dedicated pairs who agree to draw 35% of AICTE pay scales, board in Student Gandhi Gram (SGG), dedicate their services for education and socialization of the youth and live childless or bear single child at 30 years of age. Let nationalistic Gandhian bureaucrats reduce non-recurring and recurring expenses in par with PUAEC because they are also manned by Indians.

#### **FREE UNIVERSITIES AFFILIATED ENGINEERING COLLEGES FROM WRONG CONTROLS :**

Introduce educational reforms to free University Affiliated Engineering Colleges from the bureaucratic clutches to collaborate with top class institutions such as IIT's, RECs and overseas institutions for a decade so that UAECs would acquire expertise to become academically independent institutions. Let all institutions introduce December middle year admissions for all undergraduate courses by reducing fees. Let colleges run in shift and build Student Gandhi Grams for boarding and lodging for teaching simplicity in life. Such students would start life with low salaries and help capital accumulation in factories to build the technology base of this nation. Further to attract a wider spectrum of students, colleges may be permitted to offer engineering courses, technology courses and certified Labour Market Training Courses (LMTCs) of Sweden. Let trust institutions be expanded through public donations. Let Government University Affiliated Engineering Colleges be expanded on the principles of Gandhian simplicity and by employ-

ing dedicated faculty pairs. In Tamilnadu there are only 6 GUAEC compared to 125 PUAEC and it will not be difficult to find patriotic people who may dedicate their services to the nation like catholic missionaries who serve the Church. For this the nation may motivate people to become inter-caste or inter-religious or love marriage pairs and serve UAECs. Further GUAEC must be developed into model institutions by offering custom made degrees along with liberty, freedom and fraternity to students. Let campus life become a lovable and productive period in ones life. In Bradley the author witnessed students studying day in and day out without sex discrimination in libraries, labs etc. Adult boys' and girls' productivity increased when there were free interaction between them to satisfy biological needs. The upper castes usually has low biological disturbances compared to lower castes.

#### **AFFORDABLE EDUCATION BY 5 STAGE DIFFERENTIAL FEE STRUCTURE :**

This will be one of the method to create affordable education for all economic classes since wealth was not distributed after attaining self rule. Basic fees per annum for UG engineers course was arrived at 12% rate of return for an UAEC established with an investment of 90 million rupees having an intake of 300 students per batch with double admission per year and internal periodical examination. Base fees = Rs. 4,700/-. The fee structure are multiple of base fees as follows :

If people are ranked according to

their economic status in an ideal society then Class 1, the top 0 to 20% will pay five times base fees since Paritos laws says 15% of population controls 85% of resources. Class 2 the group 21% to 30% will pay four times the base fees; class 3 the group 31% to 45% pay three times base fees, Class 4 the group 46% to 60% will pay two time base fees, Class 5 the group 61% to 100% will pay base fees. Let Class I students buy foreign authored text books and Desk Top Published (DTP) class notes. Class II student have option for foreign author or Indian

author text book and DTP class notes, Class III buy Indian authored text books and DTP notes. Class IV and V buy DTP notes and refer to library books. In college bus, let class IV and V are issued with standing tickets. Let it be mandatory for those who claim as class IV and V to stay in Student Gandhi Gram and take up 20 hour per week of work scholarship or student assistantship which ever is applicable. Others can choose accommodation according to their economic status.

**Table 5 Differential Fee Structure According to Economic Status.**

| Sr. No. | Economic Status | Fees Rate | Food   | Rent  | Transport | Books | Hostel Scholar | Day Scholar |
|---------|-----------------|-----------|--------|-------|-----------|-------|----------------|-------------|
| 1.      | Class 1         | 23,000    | 10,000 | 6,000 | 1,750     | 3,500 | 42,500         | 28,250      |
| 2.      | Class 2         | 18,500    | 6,000  | 2,000 | 1,000     | 2,000 | 28,500         | 21,600      |
| 3.      | Class 3         | 14,000    | 4,750  | 1,500 | 950       | 1,200 | 21,450         | 16,150      |
| 4.      | Class 4         | 9,300     | 3,500  | 1,000 | 800       | 400   | 14,200         | 10,500      |
| 5.      | Class 5         | 4,700     | 3,500  | 1,000 | 800       | 400   | 10,400         | 5,500       |

All Institution shall offer 55% admission to lower most economic classes IV & V. Refer to table 5 for differential fee structure according to economic status. Self reliance of students will be created through work scholarship, student assistantship, part time jobs and boarding and lodging in simpler Gandhi Grams Refer to Educational reform by Gandhian techniques for building an industrial society (2). This method will open engineering education to all economic classes and create social changes by removing exclusiveness of institu-

tions for rich and poor.

#### **PROPOSED ORGANIZATIONAL PATTERN WITH ADVANCED MANAGEMENT TECHNIQUES :**

Let university establish one admission, registration and grade recording office in the premises provided by the UAECs. Let students complete admission formalities and register for required degrees in the university section by paying university administrative fees and take courses in UAECs by paying course fees. Let university section record se-

mester final marks after receiving it on stipulated date from course givers. Let the complaint cell of each university section record complaints relating to violation of academic freedom and human rights. By analyzing complaints, university may advice the management on proper scientific academic management. Reduction of faculty turnover under 10% per annum and diminishing complaints will be a symbol of good man-

agement. Let it be mandatory for all faculty members to register their courses in university by submitting the course material in respective course knowledge bank. Let all such members elect a committee to manage the journals, periodicals and books by unifying the resources of all libraries of UAECs in the university. If all departments of mechanical engineering in the university will offer 60 course choices for UG degree course

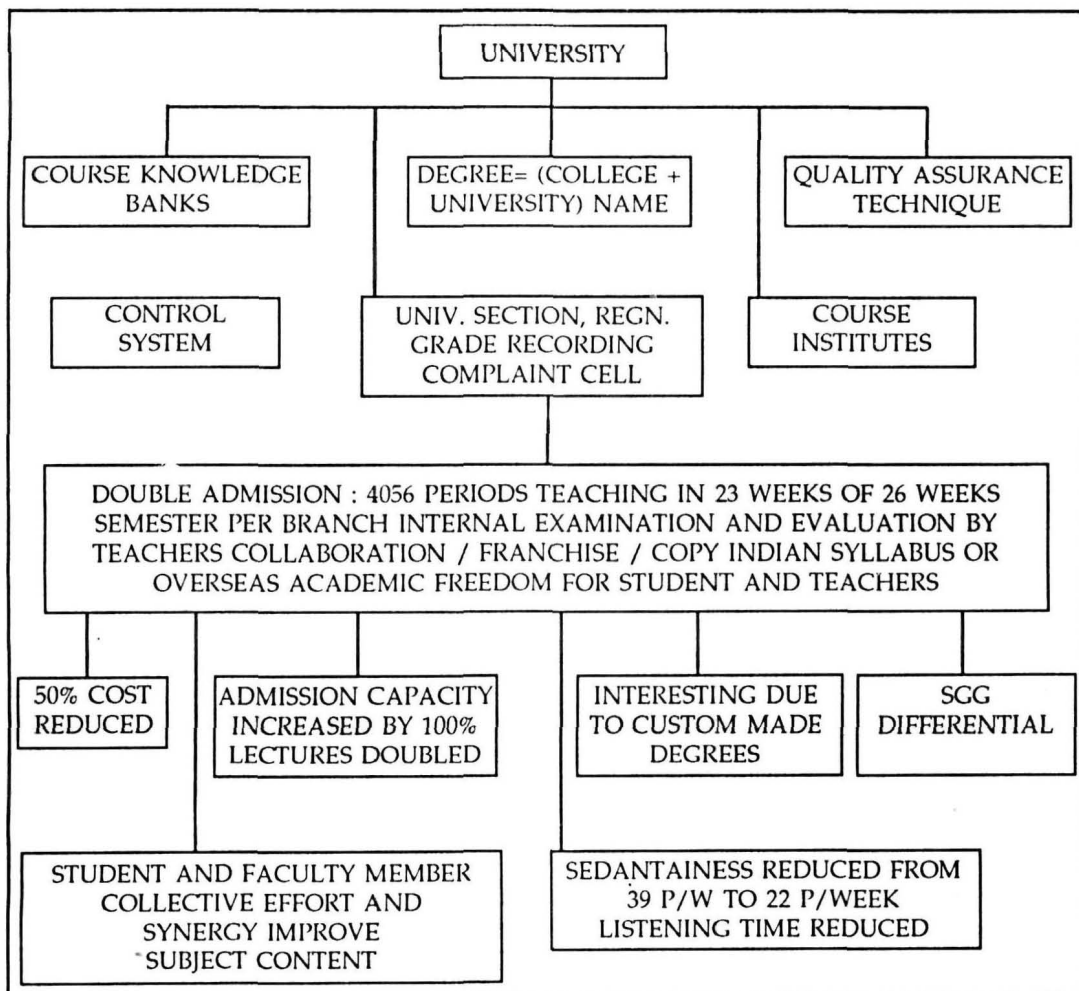


Figure 1 : Proposed Organizational Pattern with Advanced Management Techniques

and if 10 colleges offer mechanical UG degree then in average every college will chair 6 course knowledge banks.

Let course knowledge banks come under university section and give free access for teaching faculty members and researchers from any college to teaching materials, OHP transparencies, software reference books, journals so that they can innovate according to their capacities. Let the members of the knowledge bank elect every year new professor as course trainer to give coaching to all course givers. Knowledge will grow due to innovation and research. This will establish democratic culture in universities. Let course knowledge banks replace syllabus committees.

#### **CHANGE THE CODE OF CONDUCT FOR OFFICERS OF AICTE, DTE AND UNIVERSITY :**

Let the new employees of AICTE, DTE and UNIVERSITY be dedicated nationalist following Gandhian ideals of renunciation of power and wealth. Let male and female employees form pairs, marry and build families; follow Gandhian simplicity in living by residing in simple apartments so that living cost would be lower. Let them work as pairs and remain childless or bear a maximum of a single child at 30 years of age to prove their dedication. Then cost to Government would be lowered. Let AICTE, DTE & UNIVERSITY employees give up benefits of the License and Permit Raj such as the red carpet welcome of private educational trusts. Stop receiving momentous, special dinners, accommodation in star hotels, taxi, fares, black money etc. Let AICTE, DTE and

UNIVERSITY plan to create affordable, easier and interesting E & T education for all and play role of patriots and nationalist.

#### **CONCLUSION :**

AICTE, DTE and UNIVERSITY may amend educational laws to incorporate June and December admission and for introducing language bridge courses. Government may offer attractive subsidy to UAEC for establishing SGG. Let five level fee structure be implemented in University Affiliated Engineering Colleges instead of 3 level fee structure to eliminate caste based reservation. Encourage national institutions such as IITs, RECs etc. to incorporate collaborating departments to provide franchising service to PUAECs and GUAECs.

Cost consciousness is a must for a good society and Government institutions shall not be costly or inefficient compared to PUAEC. That democratic culture may be inculcated in India. To create quality jobs Sweden had invested in PSUs. GUAEC may be managed by persons like Dr. S. H. Ibrahim the Founder Principal of MSEC, Kilakarai who established 500 students per batch college with just 75 million rupees. India requires such great people to build educational institutions.

Let AICTE, DTE and UNIVERSITY employ only those members who will accept 35% of AICTE pay scale and lead simple life within their income, remain childless or bear maximum of single child. AICTE and DTE may be converted into educational research organization with an authority to study the educational technology of all University



Affiliated Engineering Colleges. Let them publish it for the information of institutions and conduct research for reduction of educational cost, teaching cost and to discover the wastage in the educational system. Let AICTE and DTE classify institutions in the format of "Patternson Guide" and liberalize licensing and permitting. Let it spread Gandhian techniques to government institution. Let dedicated people alone be employed in Government institutions to enhance open market competitiveness. Let PUAEC be free to establish and run without any hindrance.

#### EXPLANATION OF THE SOME TERMS USE IN THE ABOVE ARTICLE :

##### LICENSING :

AICTE is the apex body for licensing engineering education in India. What are the benefits of licensing ? In USA where there are no licensing and four year fees in average institution for an undergraduate study is only 1.5 times per capita income of USA while in India for the same four year educational cost in an average government engineering college is Rs. 2,80,000 which is 20 times per capita income of India. What India gained by licensing ? What purpose is gained by licensing ? Does it achieve any socialistic or nationalistic goal ? India has exhausted its foreign and local borrowing limits. Now it has no money to start new Government Engineering Colleges (GECs). Only 3 out of 1000 children born can only get admission to GECs. What the other children of India can do for higher education ? India found no other option than Self - Financed Engineering Colleges (SFECs).

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So if Government has good intentions then AICTE must specify how the cost of four year of study are to be estimated to Self Financial Engineering Colleges. It must specify cost reduction methods so as to create affordable education. But when one looks at the specification demanded by AICTE, one see factors like area of land for college, building area, lab space, student teacher ratio, lab furnishing staff salary and qualification etc. It does not make any correlation to per capita income and to expected college facilities. It does not recommend cost reduction techniques followed by Self - Financed foreign institutions such as Bradley University, 1501 West Bradley Avenue Peoria, Illinois 61625, USA. It does not specify shift colleges. It does not specify Student Gandhi Gram huts to replace hostel accommodation. The licensing rules not framed to provide economies of scale or shift operations. Out of 168 hours of a week of an institu-

tions only 40 hours are used for teaching. Further out of 26 weeks of a semester only 13 weeks are used for instruction. It does not specify how colleges can increase the instruction weeks by changing educational pattern. Further 55% of investment of an institutions are on model laboratories which are just used for 6 hours per week for 14 weeks in a year. The licensing system does not specify how to make better use of investment on Institution. The licensing system if it is scientific shall give direction on better utilization of the institution and how to offer educational services at lowest cost by increasing productivity of the institution. It does not specify how to provide adequate admission capacity as per the market demand. So licensing becomes a major factor which retards the growth of free India.

#### **SALIENT FEATURES OF BRADLEY SYSTEM :**

This represent a most economical and scientific educational pattern to provide cost effective quality education. In this system students are admitted two times a year and throughput time of convocation is six months. The system can be approximated to eight consecutive semesters from 1 to 8. In each and every one of the semester, the teaching is repeated every six months. Teachers forgetting periods are minimum. Teachers conduct periodical internal evaluations by conducting unbiased tests. So educational productivity is double as that of India. American Assistant Professors pay is only 1.3 times per capita income of USA while in India a Lecturer's salary is 8 times per capita income of

India. Bradley has two semesters of 20 weeks each, one semester of 6 weeks, one semester of 3 weeks and three semester breaks of one week each while India has only two semesters of 26 weeks each. In India theory and labs are bifurcated while in Bradley subjects are integrated with theory, lab and software. In India a subject is taught in single level while at Bradley it is taught in minimum of four levels such as fundamental level, technology level, engineering level and graduate level. The examination system for technology courses are simpler. It has four periodicals tests of equal value and portions for the test covers only that unit taught after the previous test. An undergraduate student can graduate with 40 subjects of his choice in any level. The graduate levels courses are attended by both graduate and under graduate students. A graduate student studies 10 graduate subject and audits any number of under-graduate subject without fees. Boys and girls live in co-habiting dormitories without any discrimination and were serious about their studies. Class rooms were full of business without jokes.

#### **MADURAI TVS TECHNIQUE :**

TVS company runs a matriculation school at Madurai. The school has very high standard in terms of facilities and quality of education. When there was a rush for admission, they incorporated the shift system. So the morning school shift caters to one school batch and afternoon shift caters to another school batch. So infrastructure is used by two school batch of students. The transport system caters to double the strength of students

by doubling its trips. As a result double the number of children use the facilities.

### SHIFT COLLEGES :

It is a common practice for one set of students to get admitted every year and attend 8 periods of college on a working day. Every year one batch will graduate. In this system first year course is annual while the other three years are six semester courses. To introduce shift colleges one shall divide the first year course into first semester and second semester. Further every six months one batch of college students shall be admitted into the college. So every six months one batch will be graduating. Teaching weeks under shift system will be extended from usual 13 weeks to 23 weeks and weekly lectures will be reduced from 39 periods to 22 periods. So the Odd semester 1, 3, 5, & 7 will attend classes in FN session for 4 periods. The

even semester batches 2, 4, 6 & 8 will attend AN sessions for 4 periods. They will write periodical internal examinations conducted by the course teachers instead of external university examinations. This is called shift college. In this productivity of the institution and faculty members are increased by 200%. Further students can take up part time jobs since they are free for 20 hours on any working day. If over Head Projectors (OHP) and Computer Based Tutorials (CBT) are used for education then shift periods can be shortened from 4 to 3 and college period can be increased from 8 to 12. Then one can admit two batches in June and two batches in June and two batches in December. So four shift college running duration will be  $4 \times 3 = 12$  periods. In this method institutional productivity is increased by 400% and teaching productivity is increased by 267%.

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