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Engineering Education in the Punjab

BY

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HISTORY, RECENT EXPANSION AND FUTURE DEVELOPMEN

Introduction. In 1927 Mr. Blaker submitted a paper before Congress on the Organisation of the Government School of Engineeri Rasul. Much expansion of Engineering Education in the Punjab occurred since then and much development has still to be done to m the ever growing demand for qualified engineer officers, overseers a draftsmen and the time seems ripe for a general paper on the subject w the aim of collecting the considered views of this Engineering Congr regarding the lines on which future development should proceed.

History. Military Works Establishment was the original source supply for engineer officers, overseers and draftsmen but the need local training of staff was soon realised and in 1876 surveying classes w started by the Punjab University at the Oriental College. These clas were transferred to the Mayo School of Arts in 1885. In 1906 this v converted into a Government School of Engineering still at the Ma School of Arts but in 1910 it was decided to establish a separa school which was constructed at Rasul and the Government School Engineering, Rasul started taking in students from April 1912. T school mainly produces qualified civil engineering overseers and draf men.

Largely as an outcome of the Industrial Commission Report 1916-18 the need for establishing facilities for training in Mechanic and Electrical Engineering was accepted after the first world war a the Moghalpura Technical Institute was created to train officers a overseers in electrical and mechanical engineering. The institute w renamed the Maclagan Engineering College to commemorate Gene Maclagan R. E. Principal Thomason Civil Engineering College fro 1847 to 1860 and Chief Engineer, Punjab from 1861 to 1879. His eld son Col. Maclagan was Chief Engineer, Punjab from 1912 to 191 His younger son Sir Edward Maclagan, Governor of the Punjab fro 1919-24, laid the foundation stone in 1921 and formally opened tl College in March 1924. The first batch of students was admitted October, 1923.

Civil Engineering Training for many Provinces had been going c for years at the Thomason Civil Engineering College, Roorkee and tl Punjab Government had been paying a subsidy to the U. P. Governme for training Punjabi students at Roorkee but the last batch subsidised w

for students entering Roorkee in October 1938. To replace this source of Civil Engineering officers, admissions for training in Civil Engineering were arranged in the Maclagan Engineering College from October 1938. The courses for civil, electrical and mechanical graduates were common for the first two years and it was not till October 1940 that special civil engineering instruction began when the first batch of civil engineer students divided off from the electricals and mechanicals.

In a similar way to which students from many provinces went to Roorkee arrangements have been made for students from N. W. F. P., Delhi Province and Punjab States in the admissions to both Rasul and Maclagan.

Government School of Engineering, Rasul. Mention has already been made of Mr. Blaker's paper on this school but to make this paper complete some details are repeated.

When this school was started at Rasul it was placed under the joint control of the Director of Public Instruction and the Chief Engineer, Buildings and Roads Branch but in 1921 the control of the school was transferred solely to the Chief Engineer Buildings and Roads Branch. The original aim was to train sub-overseers with the Roorkee Lower Subordinate Course as a model. In 1915 classes for draftsmen were started. From 1920 to 1922 the standard of overseer training was gradually improved to bring it up to that of Roorkee Upper Subordinates. The main objective of the Rasul School is the training of Civil Engineering Overseers and the classes have always been popular with keen competition in the entrance examination. There were 470 candidates in 1926 and over 900 in 1946. The number of overseer vacancies initially was 35 but in a few years it was increased to 55 and stayed stationary at that figure for many years. An increase in 1927 to 1930 was followed in 1931 by a reduction to 58 on account of the world slump then foreseen. This number continued till 1940 when the growing needs of the various branches of the P. W. D. in the Punjab called for an increase to 78. The demand continued to swell and to meet it, increase to 118 was arranged in 1942 and from 1945 the numbers were further increased to 212.

The draftsmen class started in 1915 was for five students in 1915 and 1916, 10 from 1917 with a similar increase in 1927 to 1930 and reduction back to ten. However in 1943 and 1945 the admissions were increased to 40 and 70 respectively. In 1925 a third year draftsman class was started to turn out Divisional Head Draftsmen and this continued till 1938 when it was dropped owing to the decision not to recruit Divisional Head Draftsmen direct but by promotion from Assistant Draftsmen. The draftsman class however has never been so popular as the overseer class and often, only those who fail to get admission as overseer students enter the draftsman class. Since 1942 the numbers coming forward have been much less than the vacancies but the 1946 candidates for entry in January 1947, will probably be enough to fill the class. In this connection it is interesting to recall Mr. Blaker's remarks. For the period

1912-1918 he mentioned a paucity of recruits for the draftsman cl owing to poor prospects and, regarding the position at the time of writi in 1927, he stressed that until the emoluments and prospects of draftsm are improved sufficient suitable candidates for training will not be fort coming. Unfortunately the emoluments and prospects were not improv for very many years. In June 1945 with effect from 1st April, 1945 t scale of pay of assistant draftsmen was made the same as the first part the scale of pay of overseers and in February 1946 with effect from November, 1945 the scales of pay of assistant draftsmen and Divisior Head Draftsmen were made the same as the first and second half of t scale of overseers. Circle Head Draftsmen have been given an ev better scale which in some way will balance against the opportunit senior overseers have of officiating as Sub-Divisional Officer or even promotion to Assistant Engineer in Provincial Engineering Service Cl II. These improvements still have not resulted in a keen demand enter the draftsman class ; in 1946 out of over 900 candidates for adm sion only two nominated for entry as draftsmen, 20 for entry as draftsm as 2nd choice and the balance of the draftsman students will be obtain by persuading those not successful in getting in as overseer students. general the best enter as overseer students and the draftsmen class h to be filled with the left overs. Properly qualified Civil Engineeri draftsmen are essential for the development of Civil Engineering in t Punjab and if after a year or so's trial on the present prospects of p there should still be difficulty in recruiting sufficient draftsmen studer then it may be necessary to consider making the terms of service f draftsmen more attractive. The period of overseer and draftsmen cour has been two years and a lot of the training is common. Plate I sho graphically the output of overseers and draftsmen qualifying each ye A certain number of the overseer admissions were by nomination up 1922 but from 1923 onwards all candidates for overseer and draftsm classes have to compete in an admission examination. Due to th defective prior education it has been found necessary to include tuition English, Chemistry and Physics while the syallabus in many subjects h been improved to permit proper absorption of other subjects, *e.g.*, traini in reinforced concrete design must be preceded by a sound training bending moments, etc.

In the past reinforced concrete course was an additional course h during the vacation for students just passed out and for those already service but now there is little need to provide for the latter as most those in service have taken the course. As it has been accepted tl training in reinforced concrete design and construction should be essential part of the training for all overseer and draftsman students it been included as a part of the normal two-year course.

A degree of military discipline is maintained ; at Rasul the stude wear uniform and are marched to and from their classes. Physi training and games are compulsory. In addition the students have use practical training in the school workshops where they learn woodwc

blacksmithy, moulding, casting, fitting, turning, etc. Every effort is made to produce smart disciplined and useful overseers and draftsmen.

The Government School of Engineering Rasul also holds classes for surveyors, road inspectors and artisans but the numbers are small and it is a matter for consideration whether it would be better to concentrate solely on turning out adequate numbers of well trained overseers and draftsmen.

Mention must be made of training undertaken for the Defence Department in their Technical Training Scheme under which 100 men at a time were trained as bricklayers and masons, a separate class for 30 surveyors was started but did not continue for long. In all 345 men were trained.

Maclagan Engineering College. After the first World War the possibilities of industrial development in India were appreciated and it was realised that such developments would result in a demand for electrical and mechanical engineer officers and overseers and, unless training facilities were provided in the Punjab, youngmen of this province would not be able to get their share of such posts. Initially it was arranged to admit each year ten officer students and 40 overseer students though it was considered that when the institution was in full swing it would provide for 50 officer students and 200 overseer students. It is interesting to note here that the numbers in the overseer class have remained practically unchanged. The two classes mentioned above are known as " A " and " B " respectively. A third or " C " class was started in 1935 for training of electrical and mechanical artisans and skilled tradesmen.

The Maclagan Engineering College was originally under the control of the Director of Industries but was transferred to that of Chief Engineer, B and R Branch in June 1925. The official name of the College in 1939 became the Punjab College of Engineering and Technology but the old name of Maclagan Engineering College was retained as a sub-title and is still generally used for traditional reasons.

The " A " class was planned to give three years technical training in Electrical or Mechanical Engineering followed by two years approved practical training in an engineering workshop, works or some branch of the P.W.D. when the College diploma was granted to successful students. From June 1932 the " A " class was affiliated to the Punjab University and the students of the class then became able to take the B.Sc. degree in Engineering of the Punjab University to be granted to them two years after their third year examination. The College diploma was abolished in 1939.

The number of admissions continued small for many years. From 1938 the demand for admission to " A " class began to increase mostly due to civil engineering being included. The bulk of the admissions are on merit depending on marks gained in B.A., B.Sc. and F.Sc. examinations but some seats are given by nomination. For the quality of the students

it would be desirable to take all in on merit and abolish nomina which allows entry of those who fail to get in on merit. Nomin students are generally a drag retarding the progress of the rest of class. It might be better if entry of B.As. and B. Scs. be stopped and F.Scs. be taken. The F.Sc. students are younger and quicker in abs ing the training and more amenable to discipline. Time spen becoming a B.A. or B.Sc. before beginning engineering training is necessary.

Admissions began in October 1938 for training of Civil Engi officers side by side with the training for electrical and mechar engineer officers. The civil engineering class immediately proved most popular and still is. The classes are common for the first two y and separate for the final year. It is now under consideration by University to separate at the end of the first year.

The "B" course provides a 5-year combined course of techn instruction in the College and of practical training in the North Wes Railway Central Workshops, Moghalpura. Most of the students f this class to date have obtained posts in the North Western Railway the class has been developed largely with that object. The time is coming when the students passing out will have a much wider choice employment and some changes in the syllabus may be required.

A few "B" class students have succeeded in passing the examinat for Associateship in the Institute of Electrical Engineers and Institut Mechanical Engineers, London.

The "C" class for artisans was largely the outcome of the persua of the late R. B. Lala Amar Nath who also contributed generously stipends for poor Hindu students in this class. Instruction is given three years in the college workshops which include carpenters' woodw ing and pattern shop, machine and fitting shop, sheet metal and welc shop, electrical fitting and repair shop and a smithy and founc From 1940 provision was made for 50 seats but 40 was the maxim admitted in any year. During the recent war this class dwindled almost nothing as the Defence Department were giving pay for training and immediate posting on completion of training so that stud preferred to join up rather than continue in class. The class is getting more students but still much below the provision of 50 seats.

Plate II shows graphically the actual yearly admissions to the A and C classes of the Maclagan Engineering College.

In 1941 when the Forman Christian College shifted to its new the department of Chemical Technology of the Punjab University moved to the Maclagan Engineering College and facilities provided training in Applied Chemistry, Chemical Engineering, Element Engineering, Commercial Economics and Practical Control of Chem Process in Factories so as to take the M.Sc. (Tech) degree of the Pun University. This department was shifted by the University in Octol 1946, to the University Buildings in the Centre of Lahore but the train

appears more allied to engineering and so should have continued to have been attached to the Engineering College of the University.

The Defence Department started in January, 1941, classes in the Maclagan Engineering College Workshops for 70 fitters increased later to 140 and eventually for 64 electrician, 120 engine artificers and 80 Internal Combustion engine-drivers. In all 539 war trainees were instructed.

The "A" class provided an Engineer Sub-Unit detachment to the Punjab University Training Corps, Indian Territorial Force. This military training has proved to be definitely beneficial to the bearing and discipline of the students. Unfortunately the Engineer training has been stopped throughout India since 1946 and the College members of the U.T.C. now get infantry training instead.

Recent Expansion at Maclagan Engineering College and Rasul. Over two years ago it was realised that expansion of technical education facilities would be necessary to provide officers and technical staff for the post war schemes beginning to be planned at that period. Recruitment in the United Kingdom for the I. S. E. ceased in 1921 for the Buildings and Roads Branch and in 1931 for the Irrigation Branch. For the new Provincial services dependence would have to be chiefly on the outturn of the Colleges in India plus a limited number of Indian students trained in Colleges in the United Kingdom. To meet the anticipated increased demand steps were taken to gradually increase the "A" class admissions at the Maclagan Engineering College up to 120. The question of one large College or two was considered and decision made in favour of the former. The admission to "A" class in 1943,44,45 and 46 were 40,64,51 and 86 respectively. The reduction in 1945 was due to difficulties in recruiting sufficient staff. The number in 1946 was against provision for 80 seats which is the limit to which the present building is considered suited. For further increase to 120 (40 civils, 40 electricals and 40 mechanicals) it was decided to move the "A" class into a new building to be erected elsewhere leaving the present buildings for "B" and "C" classes plus possibly night classes. Final selection of new site and preparation of project for new "A" class college is in hand. So far no proposals have been proposed for increasing the number of admissions to the B and C classes at the Maclagan Engineering College.

Simultaneously steps were taken to enlarge the Rasul School to admit 212 overseers and 70 draftsmen per year and the first admissions on this basis were made in January 1946 and by December 1947, the various P.W.D. departments will begin to be able to get overseers and draftsmen in greater numbers from Rasul.

The increase so far at the Maclagan Engineering College has not been to the same extent and as it is a 3-year course it will be longer before more passed out students are available for employment.

Training School at Gurdaspur. To train ex-servicemen for overseer posts in the Irrigation Branch, that department has opened a training

school at Gurdaspur for teaching ex-V. C. Os and N. C. Os from the In Engineers; these already have a basic knowledge of field engineering, sur ing and levelling. Thirty at a time are taken in a class which is for a pe of 4 months. The first class started on 4th November 1946 and the sec will begin on 2nd January 1947. The scheme is a temporary one likel last for at least a year and will definitely help the Irrigation Departmer fill vacancies for overseers in revenue divisions until such time as n qualified overseers are available from Rasul. The trainees receive Rs.60 during training. Most of these ex-service overseers will be retained for a period for duty in revenue divisions but a few may prove suitable for struction works. Obviously a two years thorough training as given at R cannot be compacted into a four month course even though the ex-serv men have had experience of field engineering and survey. The R product will mostly go to construction work and the Gurdaspur outtur revenue duties.

Special Facilities for Ex-servicemen. In addition to the Irriga Branch training scheme just mentioned the following seats have reserved for ex-servicemen:—

Maclagan Engineering College	A Class	5 per cent of admissions	4 seats	in I
	B Class		2 seats	
	C Class	25 per cent of admissions	10 seats	
Rasul School of Engineering	Overseers Class	10 per cent of admissions		18 s
	Draftsmen Class			7 s in I

Further Development of Engineering Education Facilities. most important issue is to decide what further development is neede be schemed for and provided within say the next ten years. In this con tion it has to be realised that expansion has to be ready well ahead so the increased number of students have come out of the institutions had apprenticeship or practical training by the time the actual time their employment has arisen, *i.e.*, the students have to enter the coll four or five years ahead of the demand. Expansion schemes requi building construction have to be started even further ahead. Hydel Proj and growing industrialisation of the province are bound to increase demand for qualified engineers still more and probably the call will c as much for electrical and mechanical engineers and overseers as for engineers and overseers. What is the required provision of seats? H many should there be of the main divisions,– civils, electricals mechanicals?

Already for the Maclagan Engineering College it is proposed increase the numbers from 80 to 250 in stages say 120, 160, 200 and fin 250. The latter may prove more than the employment market eventu demands but at present there is such a shortage of candidates for p that students get paid employment directly they have completed t 3-year technical training without any apprenticeship or pract experience. When the college outturn has caught up with the employm

demand then the students will have to return to the system of apprenticeship or unpaid practical experience for two years before getting paid employment and the departments will benefit by getting in much more useful recruits. Eventually the demand for graduate students may go below 250 but when this occurs the opportunity may well be taken to provide facilities for postgraduate courses in Aeronautical, Automobile, Public Health, Soil Engineering and in Town Planning. Facilities for architectural training are sadly needed already. Radio engineering training might be started and opportunities for engineering research should certainly be provided for. The University might be agreeable to setting up a M. Sc Engineering degree for some if not all the subjects mentioned above. If this idea of eventually reducing the "A" class admissions but providing additional courses is accepted then bold expansion of the "A" class to 250 admissions should not prove too much. Can the additional courses mentioned be postponed for several year or should some if not all of these courses be provided earlier?

The present idea is to site the new "A" class college somewhere near Shalamar so as to be near to the existing college, to the N. W. Railway Workshops, existing engineering workshops in Lahore and new engineering workshops likely to be established in the Industrial area close to Shalamar. It is proposed that the new "A" class college should be completely residential.

So for no expansion of the "B" and "C" classes at the Maclagan Engineering College has been envisaged but surely with the starting of many Hydel schemes and the expansion of industries in the Punjab, will there not be a big demand for qualified overseers in electrical and mechanical engineering. To what extent should the "B" class be expanded to provide that anticipated demand? No facility has been made to date for the training of draftsmen in electrical and mechanical engineering. Is there not a need to organise the "B" class for both overseers and draftsmen in electrical and mechanical engineering, similar to the way both overseers and draftsmen in civil engineering are trained at Rasul?

Probably no expansion of "C" class need be proposed as Vocational training of artisans is a matter generally undertaken by the Director of Industries.

At Rasul the expansion for civil engineering staff already undertaken to admit 212 overseers and 70 draftsmen annually should prove ample once the present shortage in the departments has been filled up. The Irrigation Branch training school at Gurdaspur will no doubt be of great assistance to that branch for filling up their overseer vacancies. That school will presumably close down after one year or so.

These expansions provide for very large institutions. The proposed new "A" class college for 250 admissions annually will require accommodation for say 800 in all to allow for a few required to repeat a year's course in which they have failed.

The enlargement of Rasul is nearly complete to provide for 63 all. The details for overseers and draftsmen numbers are :—

Overseers	Punjabi candidates	...	180	212
	N. W. F. P. candidates	...	9	
	Delhi Province candidates	...	5	
	Punjab State candidates	...	18	
	Allow for failed students repeating a year	...	8	
Draftsmen	Punjabi candidates	...	70	
	Allow for failed students repeating a year	...	2	
			292	

and thus the total becomes

1st year class Overseer and Draftsmen			292
2nd year class Overseer and Draftsmen			292
Surveyors class	...	...	20
Artisans class	...	...	20
Road Inspectors class		...	8
			632

Such numbers of 800 and 632 seems to be the maximum desirable single institutions and if ultimately greater numbers of students have t admitted then duplicate institutions would seem to be indica Keenness and quality would be improved by competition between ins tions.

Night Classes. Up to date no facility has been provided for n classes to enable students to come in the evenings for study of enginee theory. Provision for this seems to be essential so that apprent artisans, etc. can improve their technical knowledge. Architect draftsmen should have opportunities for studying architecture and so Classes up to taking the examinations of the various engineering instit in U. K. and the Institute of Engineers India should prove very us and would allow our overseers to qualify themselves for P. S. E. Clas These night classes might initially be started up attached to the Macla Engineering College but the need at several of the big industrial cen in the Punjab is envisaged. Mr. Howell in his comments on Mr. Blak pa per on Rasul referred to the way in which practical men in other p of the world succeeded in rising to high positions of control over engin ing works. Similar rise of practical men in this province would usefully implicated by the setting up of night classes. It may be m clear that this proposal of night classes is for technical enginee education and not for practical vocational classes to teach arti practical handicraft in any trade. The Industrial Department is alre running industrial schools at various places in the Province and t

schools deal with such vocational training and the Industries Department will no doubt be developing such schools (both day and night classes) but vocational training is not included within the scope of this paper.

Staff. Difficulty in the expansion to date has already been experienced over recruiting suitable staff for the technical engineering institutions. From the preliminary remarks on the history of the development of engineering education in the Punjab it will be realised that the number of teachers required to day is already many times more than the number required twenty years ago and so there are few experienced teachers available for recruitment for the senior posts and the scales of pay are still not attractive enough to attract the best youngsters for the junior posts. Only after much persuasion has Government agreed to the same grade for junior staff as for assistant engineers P.S.E Class II. Good technical training can only be achieved if the teaching staff is first class; even the juniors should have first class honours and be better than those joining the departments as assistant engineers but unfortunately that is not at present pertaining nor is it likely to occur until Government agrees to higher rates for junior teachers than for assistant engineers P.S.E Class II with similar improvement of rates of pay for the Seniors. Stinting of salaries of teaching and hence key staff is a false enconomy. The institutions at present have to take what they can get and like the Departments have to recruit passed out students without any apprenticeship or practical training. These difficulties already felt over the expansion to date will be magnified when further development takes place. All other teaching institutions throughout India are being similarly expanded and so staff cannot be recruited from them; in fact each province or institution is not allowing their staff to apply for outside posts as there is no doubt existing staff could improve their positions elsewhere but it would be most difficult if not impossible to replace any allowed to leave. Staff is as much a bottleneck to expansion of the teaching institutions as it is for the implemention of the post war schemes of the various Public Works Departments but it is much more essential initially to recruit teaching staff so that the extra teaching staff can turn out more students as staff for the construction works.

Service for Staff. In the past the institutions were small and the staff were individual appointments with the result that communal proportions had to be observed if a junior was to be selected for a senior post. The need for a service with right of promotion to senior grades with communal proportions only being observed once an entry has been realised and steps are being taken to form such a teaching engineering service. Interchange between Maclagan Engineering College and Rasul for certain of the junior posts has been accepted by Government and this development of a general teaching cadre will need extension when the new "A" class college is built and the proposed night classes set up. As the number of students increase the staff must also expand and it will be easier for them to get promotion. To date paucity of promotion prospects has been a legitimate grouse from the staff.

Exchange of Staff. Even prior to the recent war and staff short there was a large tendency for officers to accept permanent appointm and stay in one institution for 15 years or so. During the war and after the war the staff are not being allowed to go to outside posts so period has become even longer. With such long stays in one institu it is difficult to avoid a sense of frustration with loss of interest retrogression of quality due to stagnation. It therefore seems desirable that an All-India scheme should be developed to arrange provincial or inter institution exchange of permanent staff for perio one of more years. The parent province of institution could still cont to pay its own officer. Interchange arrangement has been wor smoothly for years for interchange of women teachers of Scotland those from certain of the Dominions and it should, therefore, be c possible to work out a similar scheme for interchange of enginee teaching staff in India. At a later stage it might be possible to arr interchange with colleges in United Kingdom and U. S. A. advantages of such interchanges hardly need detailing. The develop of wider outlook, the picking up of fresh ideas from the new institut and the passing on to the new institution of ideas from the parent institu and so on should prove invaluable.

Equipment. Expansion not only requires extra staff but also e equipment and it is proving exceedingly difficult to get early deliveri equipment essential, for the existing expansion of the Maclagan Engin ing College and for the further development contemplated.

Quality of Training. There can be no gainsaying that the qu of the training should be the very best in order to provide an esse sound foundation of one of the main divisions of engineering—c electrical and mechanical. Specialisation can follow if the students h absorbed a thorough grounding of the main essentials.

It is admitted that the quality of the "A" class students from Maclagan Engineering College has not been up to the desired stand but due allowance must be made for the difficulties explained above c staff and equipment. In addition recruits are immature as the dep ments are having to recruit passed out students without waiting fo apprentice or practical training period of two years or so and on account the recruits put up a poorer show. Mr. E. R. Bartlam, who recently joined the Maclagan Engineering College as Principal, is giv the matter very careful consideration so as to raise the quality to proper standard.

The Principal of Rasul has recently circularised senior P. W. officers and the Rasul curriculum is being revised to meet the critic received. However it is felt that to date the Rasul product has b nearer to desired quality than the Maclagan Engineering College "A" C product. The curriculum at Rasul has been improved by overhauling field works syllabus and inclusion of training in layout of works and tak measurements.

Passed out students from Rasul should also have a period of apprenticeship or training before being taken into paid employment. Should the supply eventually more than overtake the demand then guarantee posts for overseers and draftsmen might be reintroduced at Rasul.

Direction. The direction of the technical engineering education institutions has been one of the many numerous miscellaneous duties given to the Chief Engineer, Buildings and Roads Branch who has had and still has to deal with many other matters besides roads and buildings. The Chief Engineer has not always been able to devote sufficient attention to this part of his duties and the time now seems to have arisen when a whole time officer as Director of Technical Engineering Education will be required so as to implement the further development of technical engineering education envisaged in this paper. For such an officer to be able to deal successfully with the difficulties inevitable with the development and organisation of this huge future development it is fundamental to appoint as Director a senior engineering officer with administrative experience and it would be better for the Director to be a Secretary to Government so that he could push through the development schemes without having to pass his cases through any intermediary officer.

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Conclusion. In conclusion it is hoped that this paper will produce useful constructive discussion on the lines and extent to which technical engineering education should be further developed. Many of the ideas expressed in this paper are personal, some have not yet been put up to nor accepted by Government but the considered opinion given by members of this Engineering Congress in the discussion will materially assist in selecting ideas to submit and will give added force to the proposals.