

## PUBLIC MATTERS.

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**Early Activities.**—From time to time since its inception the Engineering Association has been called upon to give advice and other assistance upon matters which have vitally interested the general public. Very many instances can be cited, and a few of the most important are included in this Section. As early as 1871, in conjunction with the Chamber of Commerce and the Architects' Society, it took an active interest in urging the Government of the day to establish a Technological Museum, and no doubt the present fine institution owes its being to the efforts put forward by these Societies.

**Water Supply Question.**—In 1881 some discussion took place among the members as to the advisability of entering into the prevalent public discussion on the matter of a better freshwater supply to the City; in fact, letters from several sources were received by the Chairman, Mr. Cruickshank, asking that the Association would take active interest in the matter, and give an expression of opinion thereon. Evidently at that time a number of the members were of the opinion that the Rules of the Association did not permit of interference in what were then called "Works in Progress," and it was ultimately decided to abandon the matter.

Other matters investigated about this period were:—

"Modernisation of N.S.W. Patent Laws," 1885.

"Discussion on the Local Government Bill,"  
1885.

## TECHNICAL EDUCATION

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The subject of Technical Education and the formation of classes of instruction had the earnest attention of the Committee controlling the affairs of the Association fortunately from its inception, and continued interest was evidenced until the Technical classes in Sydney were taken over by the Department of Education, the forerunner of our present system. As far back as the second meeting of the Committee, on November the 30th, 1870, Mr. F. T. Rose, the Vice-President, offered to read a paper on "Whether Technical Education ought to be introduced into our public schools," clearly showing that even then, as now, a sound practical early training of apprentices and others should be undertaken by responsible persons. The first authentic classes held were in 1874 when prizes were awarded by the Association for Arithmetic and Drawing; these were formed at the instigation of the President, Mr. Broderick, in 1872-4. Following upon these early attempts, classes in Chemistry (Mr. Dixon), and Mechanics (Mr. Cruickshank), were successfully held, and prizes donated by several of the leading engineering firms instilled greater enthusiasm to the project. In 1876 a strong demand arose for the formation of a Working Man's Institute or College, in Sydney, the same year special meetings were held advocating the teaching of technical subjects in the public schools of the colony. Dr. Patterson of the Sub-Committee of the School of Arts (the then leading centre of teaching outside the schools) stated that his Committee were ready and willing to give their aid and co-operation in carrying out this object, as already conferences had been held with the Trades and Labour Council to ascertain their views. The following comprehensive resolution was carried at the above meeting, viz.: That the members of this Association have seen

and felt the great loss and inconvenience arising from the want of schools to supply the Technical Education required for carrying on successfully the various trades and industries with which they have been connected, and they consider that the establishment of a Polytechnic College, school or schools for teaching the various branches of knowledge required in Engineering, Building, Mining, Manufacture, and Agricultural industries, would be advantageous for the development of the intellectual, material and industrial resources of the colony. That such College, school or schools should be conducted in such a manner as would enable boys to study after leaving the Primary schools, and being apprenticed to any trade or profession they had adopted in their future pursuit in life. Seeing that provision has been made out of the public funds for Primary education, Grammar Schools and a University, we think a Polytechnic College, school or schools should also be provided for, and established in connection with our public schools. It would render the system more complete, and by enabling the artisans manufacturing, mercantile, and agricultural classes to obtain technological training and would meet a want of instruction existing in practical life, which none of our educational systems as at present constituted can supply."

The Trades and Labour Council wrote to the School of Arts expressing its willingness to cooperate in the formation of such a school.

The help of the Association was invoked by the School of Arts for devising the best method of instituting Technical Education in the School of Arts, and a committee was therefore appointed to go carefully into the matter.

Classes in Mechanics, Drawing, etc., were conducted by Messrs. Cruickshank and Waugh in connection with the Engineering Association pending

the formation of the Technical classes under consideration.

It was not until 1879 that any definite move was made for the establishment of the evening classes at the School of Arts, when a letter from Mr. Dowling, of the Committee of the Mechanics School of Arts, was received asking that delegates be appointed from the Association to assist in the inauguration of the proposed "Industrial Evening College."

The Secretary of the Trades and Labour Council asked that delegates from the Engineering Association, Builders and Contractors' Association, and Institute of Architects wait upon the Minister for Education re the formation of the proposed Working Man's College. In the discussion that ensued Mr. Selfe pointed out that although the Engineering Association had taken early action and stimulated the movement, nevertheless it had at an earlier date been discussed at the School of Arts as well. Mr. Cruickshank reminded the meeting of delegates that the Engineering Association was the principal factor in having the thousand pounds (£1000) grant put upon the "Estimates for Technical Education." It had been understood from a letter received from the School of Arts that the Technical College was to be managed by representatives from the School of Arts, and those from the various Trades and Technical Societies in Sydney, but it was found that after the thousand pounds (£1000) had been voted, and they were all invited together, that the Committee of School of Arts had directed that they would not be allowed to have any control in the management of the College, but were merely to be formed into a Council of advice for the purpose of organisation and regulation of the College."

The reason given for this drastic move being that the Act of Incorporation of the School of Arts invested the sole control in its Council.

The representatives of the various Technical Societies, etc., refused to go on with the scheme unless the rules referred to were amended to admit of such joint control, and endorsed the attitude of the Trades and Labour Council, and delegates were appointed to watch the interests of the Association.

Nothing apparently ensued from the foregoing discussions, for we next hear that at the end of the year 1879 the Secretary of the Engineering Association wrote to the School of Arts for a list of the classes and fees in the New Technical College.

The scale of fees was evidently too high, for the opinion was expressed by our members that setting a high fee upon the classes would defeat the object in view, viz., the bringing of Technical Education within reach of all.

A favourable reply was received and the fees reduced. The success of the Technical Education movement inspired our members to again approach the Government with the object of obtaining extra financial assistance to enlarge the scope of teaching in Technical classes; more especially would this apply to country districts; nothing came of the proposal for country classes at this time.

At the annual general meeting held in October, 1881, the Chairman (Mr. Cruickshank) in his address congratulated the Association on the part they had undertaken in so successfully starting the Technical College, and further stated he hoped that the Technical Education of youth would always receive the consideration it deserved, and would impress upon the members to keep this ever before them; also to as far as possible support anything that would have a bearing upon the Technical side of this training.

It is interesting to note that quite a number of members volunteered their services as teachers at the Technical College, and we have record of such men as Cruickshank, Blackett, Patterson, Wright, Houison and Maguire being among the number, surely an evidence of what our early members thought of this important phase of apprenticeship life. Strong recommendation seems to have been made to the then constituted Technical Education Board for a series of University lectures on any of the three branches of Engineering, but nothing came of this movement when it was pointed out that the Board had no power to interfere or even negotiate with the University in this connection.

Some dissatisfaction must have existed about the years '83 and '84 with regard to the existing Technical Classes, for we had several requests for the formation of evening classes in connection with our own Association, and in fact several appear to have been started and kept going for quite a time. In 1886 Mr. Gustave Fischer obtained the sanction of the Council of this Association to carry on an evening class in the Association room, but no evidence is available as to the exact period that this particular class maintained.

The President of the Association in 1888 took up the question of Technical Education of the Engineer very strongly. He said "that he held that Engineers' Education is a matter of great interest and importance to the civilised world; therefore I hold that keen discussion upon every theory upon which their education can be based should be of the utmost importance to our Government. In most of the schools a procrastinating system is adopted; all are made to advance as in one general plan, the quick and keen held back and the slow dragged on at a pace too great for their comprehension. This should not be. The practical work of education

should be to place within the scope of the intelligence of the boy such facts as can be retained and which are consequently more or less interesting to him. By this means a natural or true education is obtained, and an education of this kind brings about the harmonious growth of the whole man, and *not* the development of one or two faculties only. I will no doubt at some future time call your attention to what I consider to be some of the defects and advantages in Technical Education as practised in this Colony.”

The progress of the Sydney Technical College under the department of Public Instruction is within the memory of all the present members, and to men such as T. W. Turner, Jas. Nangle and others who have had the care and control of the same the community is under a deep obligation. The Association was indeed fortunate in obtaining a valuable contribution to its store of information when Mr. Turner gave his paper on “The Technical College in Relation to the Apprentice,” in which he said that Technical Education has, in modern times, become a matter of paramount importance in every civilised country, and has earnestly engaged not only the best thought of all advanced educationists, but also the attention of the world’s various governments. With the tremendous development in every branch of manufacture, and the universal exploration of applied Science in every department of industry, the old apprenticeship system broke down, and it was found necessary and desirable to supplement the practical teaching of the workshops by the theoretical teaching of the Technical College.

In a Continental tour in which he and his colleagues carried out investigations on behalf of the Department of Education of N.S.W., he found much to his surprise that Russia, particularly St. Peters-

burg, stood abreast with the foremost centres of the Continent in the matter of Secondary and Technical Schools, while Germany stood indeed in the very front rank, where the facilities for obtaining extended education were astonishing. These schools were termed "Trade Continuation Schools," and in furtherance of his report to the Board here, he proposed that these should be established throughout the State. In Switzerland he found perhaps even better conditions pertaining than in Germany. In America he found that a theoretical training was considered of the utmost importance to the industrial life of the nation. The Manual Training Schools, as they are termed, cater for the creative as well as the requisite powers of the student. These schools were to be found in every State. He found that in England, which in some respects closely resembles our own country in its educational methods, that there are three methods employed in the imparting of Technical knowledge to apprentices, but of these he did not make much comment. It was interesting to note that as far back as 1903 quite a number of large firms employed in the manufacture of Engineering commodities allowed their apprentices to attend classes during their working hours without any deduction from their wages for the time so spent. Mr. Turner said that the system adopted at the Sydney Technical College, briefly summarised as follows, was:—

*Twenty Junior* Technical Scholarships for students under 15 years of age.

*Twelve Intermediate* Technical Scholarships for students or others over 17 years of age.

*Four Senior* Technical Scholarships to organised day courses of Technical Colleges, students to be under 18 years of age.

*Research Scholarships* for students who have completed their full course at the Sydney



Technical College, while a system of Bursaries to enable students who may have to live away from their homes has also been provided for.

He was in entire agreement with Professor Pepper and other educationists whose opinions he had quoted with respect to the assertion that there was no form of encouragement comparable to that which made admission of youths to the works, and promotion of apprentices in the works, dependent at least to some extent upon educational attainment. His constant aim in directing the policy of the Sydney Technical College and the Technical Education of this State would be the enforcement of the above principle. In future the Technical College and the workshop of the Apprentice must go hand in hand.

Mr. Russell Sinclair said that the subject of Technical Education was one of such great importance that it required a very close study and intimate acquaintance with all its phases, and long experience, to justify any formulation of ideas, but as it was a subject which more than any other was closely bound up with the interests of each and all of us as engineers, it was really a duty on members of an institution like the Engineering Association of N.S.W. to give it close and earnest attention. He considered that the opinion of our members and other engineers in the profession would be of interest, if not of great value, to the administration of Technical Education in this State.

In considering the best method to adopt, he thought too great stress could not be laid on the maxim that Technical Education must be the complement of the workshop training. It should never be allowed to take the place of it, and it was gratifying to know that those in charge of the Sydney Technical College were most emphatic on that point.

Other members of the Engineering Association who expressed similar views to Mr. Sinclair were Mr. E. J. Erskine, Mr. Jas. Shirra and Mr. R. S. Vincent, and all these members were strongly of the opinion that either one of the two following methods should be adopted, viz.:—

- (1) From schools into workshop with evening school optional.
- (2) Technical College for two years and thence into workshops.

Following the foregoing it is interesting to note that the Engineering Association is now permanently represented on the Advisory Staff of the Sydney Technical College, for Messrs. Julius, Swain and Sir Henry Barraclough have been appointed members of the advisory staff of that institution.

Perhaps no more ardent advocate of the value of Technical Education to the young engineer could be found than Mr. D. F. J. Harricks. A reference to any of this member's Presidential addresses will enable one to see the profound impression he has formed in his own mind of this subject, and it has always been his endeavour to instil into both the employer and the apprentice the mutual gain to be derived from following this line of thought.

Following upon suggestions brought forward by Mr. Russell Sinclair in May, 1917, Messrs. D. F. J. Harricks and G. A. Julius were deputed by the Council to interview the Premier upon this important matter, Mr. Sinclair having said at the meeting referred to that he was glad to have an opportunity of speaking to you. I put forward my views in the address I recently gave before the Association, and I am glad you have taken the matter up seriously. The developments in Great Britain are so rapid that unless we keep track of

what they are doing, we will retrograde instead of advancing. Engineering developments have been altered completely, the employment of unskilled labour having changed all former ideas. At first the engineering firms which supplied high class work would not admit that it could be done by ordinary engineering firms, and it was not until the pressure became so great that we were on the verge of disaster that the Government insisted on unskilled labour being tried, and those firms consented to help others to get sufficient knowledge. We know now that women who knew nothing about machinery have learned to make munitions and shells which previously could only be made by men who had served a long apprenticeship as engineers and journeymen. These women have been put through the training in 144 hours and then put into shops, and are able to perform the work required even in operating machinery, and after a few months' experience these women are able to dispense with the assistance of men.

Now, after the war is over, the opinion among engineers is that this class of labour is not likely to be dropped; not that it is going to oust the skilled man, but this class of labour will be used to develop manufacturing, and the skilled man will be used for supervising the operations of gangs of unskilled labour. The "Engineering Times" sent round a circular to engineering firms asking them to give their views after their experience of unskilled labour. The replies were very interesting reading, and nearly all indicated that the results obtained from unskilled labour had been a complete revelation.

Manifestly, if an untrained person can be taught in a few hours to do mechanical work, it is unfair to ask a boy to serve five years' apprenticeship in a shop before he can be regarded as a skilled

worker. The opinion seems to be that the shops should not be the training ground for the young engineer, but some form of Trade High Schools, and that boys should spend, say, two years in the shops and three years in the Trade School. Or, the school should come after the shop; the general opinion seems to be that the school must come into more regular use. As a rule the Technical School is a place where the boy can go in the evening, after being in a shop all day, in order to gain some knowledge. It was not until it was made necessary by the war to use unskilled labour that employers were awakened to the fact that unskilled labour could be so controlled that better use could be made of skilled labour. After the war public opinion will not allow of women going back to other sources of employment, and an effort will be made in England to still retain the use of this unskilled labour, aiming at making a boy take up a position requiring more skill and training. The Trade School proposal will come to the forward very much in England, and some writers are advocating the German system by which boys receive a trade education at a Trade School.

In Australia we will not be troubled with the supply of unskilled labour because of our small community and limited manufacturing, and there being a sufficient supply of skilled labour available for our requirements for some time, but later on unskilled labour will be made great use of, and an institution of this kind ought to be studying this question so as to be ready with suggestions and advice. We should get into touch with the right sources of information, study the subject, and be able to advise Boards of Education.

A beginning has been made in England. They have taken a representative of the Trades School on their Boards, and many of the Employers consider that it will be necessary to have the Trades

Unions represented on Boards; this has, in fact, already been done, and the experiment has been very successful. In one case where the employers failed to come to a satisfactory conclusion they formed a committee of employees to deal with an employee. In Glasgow quite a number of employers followed the plan of having workmen on their Boards to make suggestions.

If we can only follow what is being done in England, and develop, we shall avoid a great deal of trouble in the future. We should be able to find out from Mr. Nangle the lines the Government is working on at present. Unions should be approached and the developments which are likely to take place should be pointed out. We must do everything possible to bring ourselves into a position to compete with other countries; if we do not, our industries will go down, and it is only by taking advantage of what can be learned from England and elsewhere about the utilisation of unskilled labour that we can make a step in the direction of helping our manufactures.

It has been proved that unskilled labour can be taught to do work after three months training, therefore it is not fair to ask a boy to put in five years getting this training. The point is: how can we evolve a scheme by which a boy can be trained for work superior to this unskilled labour. In my opinion the trade school proposition should be pushed forward, and to do this the Government will have to spend a large sum of money. No employer should have the right to take an apprentice, the boy should not be trained by the employer, but by the Government, and after training an arrangement could be made for an employer to have the boy for two years, during which time he could get the necessary shop experience, which in conjunction with the training received at the Trade School, should fit

him to supervise others. This school should be free, and I think this plan should gain the sympathy of the Unions.

Mr. JULIUS said some new system must come in Australia; we do not manufacture, we have no men trained for manufacturing, and we have to face the fact that Australia is to become a manufacturing country; we hope the country will have a big population, and we must get ready for manufacturing. Our present methods must be abandoned. The step proposed by Mr. Sinclair of abolishing the training of boys in shops is somewhat startling. One fundamental fact seems to be necessary, and that is to know what operations can be classed as unskilled, or semi-skilled, and what as skilled, because the training of workers must be governed by knowing what duties they are to undertake. A very great percentage of present training must come under the heading of unskilled work, and until a schedule determining what operations may be termed skilled operations has been drafted it is very difficult to make a move.

At present nearly all semi-skilled operatives require a five years' apprenticeship, and it is impossible for them to obtain proper technical training; long apprenticeship to work which does not require long training must be eliminated. The first step would be to determine the positions which would require to be filled by skilled operatives, and then have the Trade Schools divided into two parts. He thought it would also be desirable to have a third department for the training of managers. If a schedule were drawn up dividing the work into two classes, we might formulate some scheme with regard to the amount of training that would be suitable for each class, and bring forth something useful in connection with the Technical College here. Possibly, as a whole or as a sub-committee, we should ask Mr. Nangle to appoint someone representing

his Institution to give us a basis on which to work. The greatest difficulty is to arrive at something definite in that direction. It is obvious that we must do something early in Australia or we shall be hopelessly left in the near future.

Mr. SINCLAIR suggested that a boy might spend the first two years in being taught unskilled labour, and then after that two years, if he decided to go on to the skilled training, he could do so. If through not being able to afford it, or not aiming at anything higher than unskilled work, he could drop out and join the ranks of the unskilled.

Mr. TOURNAY-HINDE said he thought the great difficulty with this or any body or sub-committee which may be formed to deal with the question is opposition from the workmen, even though we tried to work with them. It is possible that if they realised what is being done in England they would come to the position that they will have to come to ultimately.

By reason of the Awards and Masters and Apprenticeship Act a boy must be apprenticed at sixteen to finish at the age of 21, and we have had many instances of youths over that age who had made a start in a calling for which they were not fitted, and who would have been very glad to work for three years even at a lower wage, so as to change to an occupation that they were more suited for. It is manifestly wrong that a boy should spend those years doing work which he does not intend to continue.

I think we should try to formulate a few salient suggestions that may require legislation before we can make a move, but if we could formulate these ideas and approach the Minister, he would be able to put some of them into effect in the new Labour Act that will come before very long. There should not be an age limit in the cases of those who want

to learn to be skilled workers. It is a very big break away to change from what has been considered so to be the right thing to do. There has been a great deal of exploiting of cheap labour by the employer.

If a boy is to be trained in a Government School until he is 18 or 20 there must ensue a period in which he is not earning money, and in most families it is essential that he should earn money; that part of the question would require some arrangement so that the boy could earn money whilst getting his training. If he could divide his time between the shop and the training school, it would enable him to support himself whilst obtaining his technical training.

Some little time ago the Wages Board determined the rates of pay, and an attempt was made to bring in a clause for the utilisation of boys who should be paid higher rates than apprentices, and that they should be termed apprentice craftsmen. The President of the Board did not seem inclined to insert the clause, and he suggested that the Unions and Employers should meet. After several discussions the two Union Delegates came to the conclusion that there was fair reason for the Clause being inserted. Nearly six months passed without any decision being arrived at, and ultimately it was announced that the demand could be acceded to.

I would suggest that we formulate some sort of amendment that could be suggested in the Apprenticeship Act and the Industrial Act, by which the method of training boys, the conditions of work, and the amount of wages could be controlled.

Mr. McEWIN: The question of the maintenance of students during the time they are in the training school is a difficult one. It would be of great assistance if the schools were free. The question of the welfare of the boys should be considered, their



health and the conditions in which they are living. Boys who are physically unfit should not be given work for which they are not suited.

Mr. W. SINCLAIR said that in engineering there are two trades, the inside and the outside, and the development in England is all inside. There will be a natural tendency to slacken off after the war, and if things are made too easy for the workers and the strong incentive to work which exists at present has passed away, there will be a great slackening in effort.

Mr. FILDES said the workers' education scheme is doing excellent work, but it is too academic; it will not go into practical work like this, but this Association should work in sympathy with it.

Mr. NANGLE said: I must confess I am at a loss how to formulate the few remarks I am about to make. We shall have to throw overboard some old connections, but I would like you to understand that before doing so the whole thing must be well looked into if we are going to improve technical education in this country.

We have passed through a long period of war and a tremendous upheaval has taken place; things have changed greatly. You are wrong if you think these conditions are going to materially affect us; this will not be a manufacturing country for a very long time to come; it will be a reproducing country. The next thing we have to remember is that these wonderful conditions will not obtain after the war, but we shall have to meet very changed conditions all the same. Progress in this country is greatly held back by industrial conditions, and I think employers are very largely to blame for this state of things; they are often so concerned about keeping the wages down that they fail to see the more important point of the worth of the service they obtain by giving better conditions. The minimum wage is one of the

difficulties in connection with apprenticeship. Trades should be classified; the Cabinet has a scheme for this in hand at present.

In 1913 the Director of Technical Education asked employers and employees to send representatives to discuss the matter of technical education. Representatives were nominated, and the Conference lasted through 1913. Mr. Board presided, and cordially invited them to give him the best advice they could as to how he could organise technical education so as to make it fit in with the requirements of trade. The consequence was that in 1914 we had started upon a scheme which was based upon representations made; some points were more strongly supported by the employers than by the employees, but all agreed that to deal successfully with the apprenticeship question the State must take a hand as well as the employer. My opinion is that for the last forty years the Technical Journals have been filled with Council meetings that express regret that the old apprenticeship system had collapsed. It could not be carried on in the present day because no employer could give to the apprentice all the training he requires; but it is held that you cannot consider a man a skilled workman unless he has had practical training. He has to get some knowledge of the underlying principles, and the State should provide the means for obtaining this knowledge through its system of State education. Part of the system was that the classes were to be supplementary to the training received from the employer, and no one would be allowed to join a class unless they were also having practical experience; an Advisory Committee was to meet at the College three times a year to discuss the work that is being done, and freely criticise. At present we have 8,000 students for mathematics and mechanical drawing, and all are receiving supplementary training. One of the difficulties we meet with is this: that there is

no doubt that in some of the trades the time of apprenticeship is too lengthy. You cannot make any step forward unless you decide upon the subdivision of the Engineering trade; it would not be a difficult matter to get a classification of the trades. In the first place, the restriction about the age of 21—we must admit that the ordinary worker should get a living wage at that age; there should not be any obstacle in the way of anyone becoming a skilled worker. If a boy attending a high school finishes at the age of 18, it is desirable that that boy should be allowed to enter a trade. This year I have had 500 boys whom I have sent to employers, highly qualified, and I have only been able to get one firm who will take them; that prevents our taking boys for three years' training, because at the end of that time it is difficult to get them positions. Practical training concurrently with skilled training is the best scheme. The fixing of the age for the minimum wage at 21 has been the reason for the exploiting of employees by employers; they take a boy at the age of, say, 18, and when he reaches the age of 21 he has to go. If we can satisfy the Unions that the proposed system of technical training and practical experience being obtained at the same time is one which will not result in the exploiting of labour they will be hand in glove with the idea.

The soul is being taken out of the populace; the country is becoming filled with people who go in for rapid training and high wages. The high price of unskilled labour is a great trouble in this country. In an educational system that is to be successful the boys must be taught to use their brains, otherwise there will be a soulless lot of workers. Sound knowledge produces sound work. You cannot make a good foreman in the technical schools; these men must receive practical training, and five years is not too long to spend in turning out a successful tradesman, who will be prepared to deal with any job.