

## DISCUSSION.

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Mr. Russell Sinclair, in opening the discussion, said he did so with very great diffidence, as 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, let alone criticism, of such an able exposition as the author's; 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 ours to give it close attention and earnest discussion. In reading the author's paper, it appeared to him that the whole hinged around the question as to which of the three methods of technical training described on page 108 was the best to adopt, viz. :—

- (1) From school into shops, with evening classes optional;
  - (2) Technical college for two years, then to shops;
  - (3) Alternately between technical college and shops.
- He considered that the opinions of members as engineers engaged in the practice of their trade or profession might be of interest, if not of value, to Mr. Turner, and those who were charged with the duty of administrative technical education of this State.

In considering the best method to adopt, 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 note that on this point Mr. Turner was emphatic. The author, in his conclu-

sions, did not appear to have definitely laid down which of the three methods he finally had decided on as the best, and he (the speaker) would like to ask if he would, in the course of the evening, feel himself at liberty to do so.

He would simplify the consideration by putting the third method aside, as not suitable, except for such specially favoured students who, by reason of financial position, were able to more or less please themselves and who were thus able to follow up higher education, but for the great majority of young engineers, with whom the necessity of becoming a self-supporting member of the community as early as possible was important, this method was not suitable.

As between the first and second methods, if it were not (to use Mr. Turner's words) "for the apathy and indifference towards educational improvement so general among apprentices and young workers generally" (and he would add more especially in Australia), he considered that the first method was the best, as giving more scope and freedom to a student to follow up the lines and branches of engineering which most appealed to him as he gradually gained experience, and also because to an apprentice, who had his whole interest centred on learning his profession and becoming expert at it, it did not require any hard and fast rule or law to make him attend classes to improve himself; but in the interests of the State it appeared to be necessary to regulate and make education, to a more or less extent, compulsory, and it seemed to him that the best method for this State to adopt was the second one, in which, from school, it would be compulsory for those who desired to become apprentices or to engage in a technical trade that they should be compelled to attend a technical college for two or three years, and from thence proceed into the workshops for a period of fixed apprenticeship.

This system appealed to him as one in which it would be possible to adopt some plan of weeding out those who were not intellectually or physically fit for the particular trade or profession which they thought of adopting. There could be no question that there were a very great number of lads sent into workshops who have no whole-heartedness in what they were sent to work at, being sent merely because some relative was in the same line or happened to have a little influence to get the boy put to work, and from the desire of parents to get a boy out of the house and earning a few shillings. These were the lads who seldom did credit to the profession, and more particularly in engineering was it necessary that an apprentice should be thoroughly in love with his work; and it was not always possible for a lad, once he had started and been one or two years at the trade, to back out, but he found he must go on, and, when the whole apprenticeship was finished, it was too late to take up something else. The advantage, therefore, of having two or three years at a technical college before he entered an apprenticeship would be great in eliminating this defect in our present system. It would also have the advantage of enabling a lad to change his ideas from one direction to another, or to commence specialising.

He was not in favour of young engineers commencing to specialise too early, because then they found it was a handicap later on; but, with the trend of mechanical appliances and systematisation, every engineer must from the very outset keep in mind which particular branch or line of engineering he hoped to make his special study, and the technical education, if given before the workshop practice was entered on, would help very much towards a lad being able to settle the various roads that he wished to follow.

The question as to whether the apprenticeship in the workshop should be shortened after taking two or three

years in the technical college was one which was open to very wide discussion and serious consideration. Personally, he was not inclined to favour any shortening of apprenticeship under five years, even if two or three years of technical training was obtained beforehand. It would take the whole of five years to make a good journeyman, whether in the shops as a mechanical engineer or as a draughtsman, or in any other trade. The question, however, was whether it would be a hardship to the majority of apprentices to insist on them taking what would really mean seven or eight years' apprenticeship.

Looking back on old times, it was not uncommon for a seven years' apprenticeship to be served, and even now it was not uncommon for an apprentice, after serving five years, to find that he must work for two years as an improver, and the recent award of the Arbitration Court, referred to by Mr. Turner, provided for two years as an improver. Would it not be possible to recognise that if a student takes three years at a technical college before he goes as an apprentice for five years, that he need not go as an improver, but could be at once rated as a full journeyman?

On the other hand, if this scheme was adopted in principle it became the duty of the Government as a corollary to provide the necessary technical accommodation throughout the country for all students as they left school, not only that, but it would become necessary for the Government to make such arrangements with different engineering employers that all students who passed the examination and were proved by the technical authorities as suitable for the business that they proposed to enter, should be, as a right, assured and given an opportunity of entering a workshop. This, perhaps, was somewhat of a large order; but, in the interests of the State and our future position in the com-

merce of the world, he did not think it was any too much to ask of the Government. He was quite sure that if a scheme of this sort were made part of the law of the land, that all engineering employers would, to the utmost of their ability, assist, as it would be manifestly to their advantage to have a recognised stipulation made that the admission to the workshops of apprentices was only obtained by the production of a certificate from a technical college of competency in the particular branch of knowledge required.

But an objection might be raised that a stipulation of this sort would mean a hardship to those who were not able to maintain their children while they were earning nothing at a technical college, and to provide for this he would suggest that the Government should extend the scheme of scholarships and bursaries already provided. No doubt this scheme was munificent, as outlined by Mr. Turner, but, looking to the future, it appeared to him that it could very well be made a burden on the State to make this still more liberal, and even, if necessary, to make special concessions in the case of lads who could show that their continuing at the college after leaving school would be a handicap to their parents or themselves.

He would like to ask Mr. Turner, in explanation of the German Trade Continuation Schools, whether the provision which was made for children after leaving the compulsory period of attendance at the primary academy to continue their education in the Trade Continuation School was compulsory or optional, and whether these particular Continuation Schools were conducted during the daytime or in the evening, or both together. He understood from Mr. Turner's remarks that the apprentices were compelled to attend the continuation classes. The point he wanted to get at was whether the

lads were compelled to attend a technical school before becoming an apprentice in Germany.

Another question was also whether in America there was any compulsion, or was it entirely optional whether a student made use of the very splendid system of technical education provided there.

Mr. E. J. Erskine said that the author, in his very able paper, had placed before us in a concrete form the various methods adopted in different countries for the education of boys and young men desirous of entering into the engineering profession.

We probably were, most of us, aware in a general way of the methods adopted, but it was only when they were placed before us in a paper of this kind that we fully realised what had been done and the very great importance that must be given to the education of these young men.

The author, he thought, was rather hard on the British manufacturer, and what occurred to him on reading through the paper was whether, after all, the English manufacturer could have been quite so indifferent as he was reputed to have been. Was it not extraordinary that, if really nothing had been done to educate the youth entering the engineering profession, if he had been so terribly neglected, whereas his German cousin had been so very well looked after, did it not seem peculiar that, in spite of that, we could point to quite as many, if not more, highly scientific engineers, who had derived their education in Great Britain—some of them risen from the ranks? He was not prepared to admit that the British manufacturer had been so lax. There was no doubt that, for a great number of years now—at any rate, twenty-five—a youth entering into a British factory as a pupil or apprentice had been watched very carefully by those over him; and he ventured to say that, if he had shown ability, not only had no stumbling

block been placed in his way, but every encouragement had been given him. If, however, the youth did not show a wish to learn and a keenness for his work, then there was no doubt he was allowed to go his own way, and probably left the shops with very little more knowledge than when he entered.

He was inclined to think there was the same difference between the education of the engineering student in Great Britain and Germany as there was between the education of the ordinary schoolboy in those two countries. In public schools in England there was no doubt that the boy who showed an inclination to work was immediately taken an interest in by his masters and forced ahead, whereas when the masters found the boy lax and inattentive they were, after a few attempts to make him keen, inclined to drop him and let him go his own way; whereas in the foreign schools that backward boy was taken in hand and given even more attention to than the one who showed his keenness. Now, while in the schoolboy the foreign methods must appeal to us as being absolutely the correct methods, he was not prepared to allow that the same was so necessary for the student in engineering. It must be apparent to all of us who had been in the profession for some years that every second or third boy born developed at a very early age (either in his own opinion or in that of his parents) an absolute genius for engineering. He thought it was also pretty certain that before a great number of these boys had been with us a month we had fully realised that they were not going to turn into engineers. Now, he considered it was little short of criminal, to encourage those whom we saw, early in their career, were not suited for the profession, and it should be our duty, so soon as we had satisfied ourselves on the point, to get the parents to try some other walk in life; but he was afraid this was not being done, but that

the evidently square peg in a round hole was persevered with in the hope of being able to make it fit later on, in the meantime keeping that lad away from some trade or profession wherein he might shine. The system in England that used to prevail—and, he thought, to a large extent still did—of putting the boys straight from school into the works, he was still much in favour of, as within a very short period, if the lad had not the mettle in him for the job, he would be glad to make any excuse to get out, and it did not appear to him that if he went to a technical college he would find out so quickly that engineering was not his game.

He did not mean, from the foregoing remarks, that he was not in favour of the technical college education. He thought we all agreed that such education was absolutely imperative to the aspiring tradesman; but the authorities should beware of going too far. It would be interesting to know how many of these boys were being turned out per annum and put on the market to battle for a living. That it had been overdone in England was apparent to all of us, the consequence being that when a boy had served his five years he was lucky if he could get a position carrying sufficient wages to enable him to live. This was entirely due to the tremendous number of engineers turned out annually from the various works, and he thought it behoved us here to see that the supply was not created out of all proportion to the demand.

Perhaps the author would think that he had been talking too much on the professional side, and would argue that the technical college was more for the training of tradesmen, namely, of the worker with his hands rather than for the master mind of the professional man.

He was aware that it was almost a sacrilege to sound a warning note in connection with technical college education, but was it not possible that this education might



be carried too far? We had our Universities for training the professional man, and in his opinion the technical college should confine itself to training the tradesman, and in so doing should be careful not to overstep the mark. While we should all like to be bosses, there must be workmen, and we should beware of so training these workmen that they would be too big for their work. Judging from some of the papers that he had seen set for technical college second-year students in turning and fitting, he feared that the Technical College was rather stepping into the bounds of the University—and that, in his opinion, would be an error.

He ventured to think that the Technical College, in training the tradesman, should be careful not to over-train him, picking out for special training those who showed that they had the necessary ability and application to take advantage of higher education. We must have tradesmen, and, in his experience, the tradesman, to be really good at his particular trade, must not be too full up of knowledge of other trades. In almost any trade there was sufficient to be known of it to occupy the learner many years. How, then, could he become proficient at that trade if he was expected to learn others, and, in addition to that, was expected to become efficient in mathematics, etc.? It was, therefore, to be hoped that the Technical College, in dealing with this all-important question, would not over-cram the students, but would give to the engineering shops tradesmen conversant with everything connected with their trade, but not (if he might use the expression) over-educated to such a degree that they were above their positions.

Coming back to the question of overcrowding the trades. Where the authorities were likely to have trouble in the future appeared to him to be under the new tendency of restricting the number of apprentices and improvers that were to be employed in proportion to

the men. He was fully aware that the employment of pupils and apprentices in the past in some works had been overdone, and there was no doubt that the workmen had serious cause for grievance in that respect; but it was possible to go to the other extreme, and if we were to employ all these lads as they left the Technical College, then legislation must not be too severe in laying down the number that we were allowed to employ.

He thought we were very much indebted to Mr. Turner for having placed before us such valuable information on the subject, and considered that the State was to be congratulated upon its liberality towards these technical schools. The scholarships mentioned certainly should give considerable encouragement to students, but would it not be worth consideration to give those students who had proved themselves as being able to step out from the ruck a chance of joining the highest sphere of professionals by paying their way at the University to enable them to finish their education? We had men in our own Association who have risen from the ranks, stepped up above everybody by their own exertions and ability, even in the days when such things as technical colleges and universities in Australia were practically unknown, proving that among the boys at the Technical College there might be some that should be assisted to step out of the tradesmen's ranks into a higher sphere, leaving the less able to follow the not less useful calling of tradesman; and he would suggest to Mr. Turner the consideration of granting such scholarships, enabling these to attend the University, there obtaining the necessary training for the higher calling.

Mr. R. S. Vincent objected to the author's remark, "notorious apathy" of the British manufacturer on the question of interest in his apprentices' technical education. It was a well-known fact that employers used every endeavour to encourage their apprentices in this direction.

He must take exception to the author's statement that "drawing is the basis of all instruction," and contended that the teaching of drawing without actual workshop practice was futile.

Mr. P. Connie considered that papers of this kind should be read oftener. One point not touched by previous speakers, and that was one that he would like to suggest—that the Engineering Association, as an association, should take some such standing as the North-east Coast Institution of Engineers and Shipbuilders had done, and in some way to formulate a scheme on similar lines, and suggest to the New South Wales employers adopting such. As a reward for those who attained the highest marks in their shops, the Engineering Association, as the premier body of engineers of New South Wales, might offer a reward—say, the blue ribbon of the year would be publishing the names of those who attained the highest number of marks in the proceedings of our Institution. He would suggest that the Council take the matter up in that way and see if something could be done under those lines in Australia.

Mr. James Shirra (President) considered that we were much indebted to the author for laying this matter before us, and specially for his statement of what our Government was doing to promote technical education in New South Wales. It appeared to him that if we could get the opinion of the members of this Association on the latter part of the subject, whether the assistance given to students was likely to be effectual or was given in the best way, and whether any better plan could be suggested—it was easy to criticise, but difficult to suggest improvement—great good might come of our consideration of the subjects.

There were two subjects involved, Apprenticeship and Technical Schools. The old apprentice system, we were told, had utterly broken down, and it was found as necessary as desirable to supplement the practical

teaching of the workshops by the theoretical teaching of the Technical College. Now, this was very true, but there was a feeling abroad that the word supplement might be read supersede, and that the Technical College should give practical teaching which would make the workshop training unnecessary. If one reads the advertisements in American magazines, he sees that technical teachers offer to fit anyone for any walk of life, from a plumber to a barrister, by correspondence only, without any experience at all. Certainly that was not what Mr. Turner proposed, but, in his opinion, practical work in a shop or factory should either precede or accompany theoretical technical education; and the money spent on scholarships to boys still at school would be better spent in providing salaries to instructors of the very highest type in arts and crafts, who would demonstrate to the young workman the reasons for the methods he saw followed in his daily work at evening classes. This was done now, but he did not know if the salaries paid such instructors were sufficient to attract the best men. A man could not do a day's work in a foundry or boilershop and turn up fresh three or four nights a week to teach a class. His pay as a teacher should at least equal that of a foreman in his particular trade.

The question of premium apprenticeship arose here. An employer contracts in consideration of the premium paid to instruct an apprentice in a specified craft or trade, personally or by his foreman or superintendent; it should be the function of the Department of Labour, or the Conseil des Prudhommes, or some authority to see that value was given for the premium in the employer's own establishment, and that he did more than merely find the apprentice in work and pay his fees for evening classes. He thought the author had dealt rather unfairly with the employer, the average British

manufacturer, say, who was contrasted with the American of the same class, much to the former's disadvantage. The examples given of encouragement to apprentices in engineering and other works in England showed, anyway, that the apathy was not universal; while it was ignored that in the cotton mills and collieries of the Southern and Middle States the condition of the work-people, especially the young people, was still as bad as it was in the pre-factory-act days of English manufactures. The Northern States and Germany were deservedly held up to us for imitation, but we were reminded of the educational enthusiasm and mental activity which were so characteristic of the students of the Fatherland; and in the report of the Mosely Educational Commission, which investigated American Technical Colleges in 1903-4, on all sides we heard of the earnestness of the American technical student, the great interest he took in his work, and his intelligent appreciation of the problems put before him. We might contrast this with what Mr. Turner calls "the apathy and indifference so general amongst apprentices and young workers to educational improvement," in suggesting that it might be largely removed by employers promoting or advancing them—that was, from the ordinary point of view, paying higher wages, for educational as well as practical fitness. But was not practical fitness all that the employer wanted, and could we always expect an employer to take trouble about the higher education of a young man who would have no hesitation in leaving his service and going over to a rival master if he thought thereby to better himself, and who possibly took no interest in the success of his employer's business at all, looking to his Union as his real "boss," which would keep him in work and wages?

The crowded state of our technical college evening classes seemed to disprove this allegation of apathy