

**INSTRUCTIONAL FACTORIES AND TRAINING COURSES:
THE INCEPTION AND IMPLEMENTATION OF TRAINING COURSES FOR
UN-SKILLED AND SEMI-SKILLED MUNITIONS WORKERS
DURING THE GREAT WAR**

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ABSTRACT

The Great War shell scandal of 1915 was as much to do with a lack of skilled workers as it was to do with the early inability of the Munitions Industry to manufacture the war materials required by the war. The number of skilled workers had never been large and volunteering for the Army on a large scale had drastically reduced that pool. Attempts to avoid ‘dilution’, or the use of un-skilled and semi-skilled workers, particularly women, in the munitions industry in the early months of the Great War failed. The Volunteer Scheme was an initial disaster for the newly created Ministry of Munitions. Recalling skilled men from the Army failed in equal measure. The only way for the Ministry to plug the skills gap, was to bring in semi and un-skilled workers. In 1916/17 Technical Institutes like Loughborough and Aston began to run short training courses for workers.

Keywords: Workforce, Training, Productivity

1 INTRODUCTION

In spite of the failure to obtain skilled workers, there *was* a pool of manufacturing ability in the country. Many of the women, youngsters and wounded soldiers who joined the workforce became just as skilled, able and energetic as the men. Munitions work consisted mainly of repetitive operations to manufacture standard articles in large quantities. Hence, standardised, mass production was required. In pre-war days, there had been comfortable markets and the “conservative habits” of the skilled worker in the workshop ensured that the production of articles could be switched as required but output was small and slow (HMSO, 1920). The war machine needed standardised items, produced on a vast scale and quickly. Investment was not a bar, wage demands could be met, new machines and devices for speeding up production could be designed, tested by skilled engineers and scientists. Importantly, training for the new workforce could be paid for, improved and expanded.

2 THINKING ABOUT PLUGGING THE SKILLS GAP

As the Ministry came into being forward thinkers in educational establishments and in the government were considering the speedy training of semi-skilled workers for munitions work. Technical Colleges, Institutes and schools were obvious places to train the new workforce but many were not well enough equipped with modern machinery on which to train. Some had possessed modern equipment but had been forced to hand it over to the new munitions factories. There was a shortage of skilled tutor/instructors because such educational personnel with industrial experience were either already involved in manufacturing in the war work factories or in the forces. In addition, because of the nature of the pre-war courses that they ran a number of the Technical Institutes and colleges had not employed such skilled staff in the first place. Among other courses, the Technical

Institutes ran domestic, art, commercial and Volunteer Aid Detachment courses (Loughborough, 1915).

3 VOLUNTEERS

Professionals and tradesmen from industries and trades suffering a downturn because of the war came forward in large numbers to do their bit. It was to the Technical Institutes, colleges and schools that these people applied for training courses. The Ministry was keen to employ those who had some skills rather than the un-skilled who also came forward to help, for a number of reasons. Firstly, *if* they could be trained up they would quickly fill the skills gap. Secondly, as already skilled in another field, they would not irritate the unions and after the war they would go back to their old jobs and professions and not clog up the engineering labour market.

4 FACTORY TRAINING

The problem with current training in this area was that it was based upon the traditional and lengthy apprenticeship system learned on the workshop and factory floor. It was known that employers would favour those who had trained in the traditional fashion in the factory above any worker who had been on a training course at an educational establishment. This was despite the facts that those coming forward, clamouring to train as munitions workers were often intelligent, adaptable and very well motivated to do the job. The educational establishments were having to turn these people away because of a lack of machinery and tutors. Not every Technical Institute had a training syllabus in place and there was a worry that even if the volunteers were trained the factories would not take them on. The Technical Schools and Institutes “could have been filled many times over in the summer of 1915” but they were not (HMSO, 1920). While it was trying to attract skilled men from private firms, the Ministry had been looking for volunteers in the wrong place.

5 INITIATIVE BY EDUCATIONAL ESTABLISHMENTS

In the late spring and early summer of 1915, some Technical Institutes, Local Education Authorities and Munitions Committees took the initiative, not the Ministry. Technical Institutes at Birmingham and Aston were the first to go ahead and collaborating with the local munitions committees ran their own training courses for munitions workers. They proved a point. The trainees or students turned out to be excellent material, making a deep impression upon those who did employ them. It was obvious that if only the resources could be found and attitudes in certain quarters could be changed then the nation possessed a large labour resource.

On 26 June, inspired by the work at Birmingham and Aston, Sir R. Blair informed Dr. Addison that the Metropolitan Munitions Committee of London intended to give an order for the manufacture of gauges to the Polytechnics in the area and that the local Technical Institutes would provide some training courses (for munitions workers). Blair requested that he be put in touch with someone in the Ministry who could specify what kind of training was required. He sent a report made by the London County Council to the Ministry highlighting the good work being done by the Birmingham and Aston Technical Institutes in this training area.

6 GOVERNMENT AND MINISTRY CONTROL

As a result, Dr. Addison decided that the best Technical Schools and Institutes should start training courses and be given contracts for small quantities of shells to allow the students to train. Other schools and institutes that were not deemed good enough would have to give up any of their remaining machinery to the National Factories. This distinction could make or break an educational establishment. Early in July the Ministry contacted the Board of Education about training and stressed the need to train workers. The Technical Institutes, the Munitions Committees and the Local Education Authorities already knew what was required of them.

The courses being run by the Technical Institutes were between 20 and 120 hours in length depending upon the equipment that the students were training to operate. Short courses trained students specific operations on specific machines, longer courses offered similar training along with

bench work and more specific skills. The Ministry advised the Institutes to contact their local munitions factories to ascertain what type of workers were needed so that they could tailor the courses accordingly. All of the training was to be certificated and all of the courses were eligible for grants from the Board of Education.

The Ministry appointed Mr. T. M. Taylor and Labour Officers to oversee the project and co-ordinate the educationalists. They were also to make it plain to the employers and unions that workers of "superior education" from other skilled jobs and professions would be trained and offered up for placement. These workers, at the end of the war, would return to their own work. They would not clog up the labour market or cause trouble for industrial relations. The Labour Officers also had to obtain information about the Institutes and schools themselves.

7 FINANCE FOR THE PROJECT

The question of finance was addressed and on 17 September 1915 the Ministry approached the Treasury asking that the following be sanctioned: The salaries of teachers at the Institutes be paid while undertaking this instructional work. The heating, lighting and cleaning costs of the Institutes be covered. The cost of damage to the premises and equipment would be paid if required. A financial allowance be made available and met for depreciation of plant. The cost of providing, re-setting or re-assembling plant for training purposes be met by the Ministry. These demands were agreed on 28 September. Funding for the project, at least, was in place.

8 REPORTS ON WORK ALREADY UNDERTAKEN

It did not take long for Taylor's Officers to return their findings about the work already undertaken and the opinions of the industry. Courses had sprung up all over the country; some had been successful and their students had been placed in munitions factories. At these institutes the courses had been well planned and well taught and the employers were satisfied. Other courses fared less well. Some classes were cancelled before completion. In some cases students had been trained but had not been placed. Some courses were too academic; others were not in touch with the latest working practices and machines. Some courses failed because the quality of teaching was poor. In some cases employers were apathetic to the work of the Institutes or hostile to the whole project. In some places where workers had been placed, they left because of the hostile attitude of workers, foremen and unions. The Ministry and the educational establishments recognised that if this attitude could not be overcome then the training program would be compromised with disastrous consequences for munitions production. When reticent employers were quizzed about their attitudes they said that they thought the training provided would be inadequate. In many employers' opinions, a week's training on the job in the factory was worth a month on a training course. Others said that if they wanted operatives for repetitive machine work they could obtain women from textile mills who could already run machines. Institutes were advised to take students from non-skilled and non-professional backgrounds to increase the pool of workers. This worried the educational establishments. They liked bright and adaptable students because they learned quickly, graduated on schedule and were less likely to damage expensive and valuable equipment.

9 PUSHING ON WITH THE PROJECT

Despite opportunities offered by factories for volunteers to start on the shop floor and learn there, some volunteers wanted a grounding in their new work before they plunged into factory life. Because of this the Technical Institutes and Schools said that they were the best entry point for those volunteering to work in munitions.

For the training program to run efficiently employer's concerns had to be addressed and Herbert Schofield, the new head of Loughborough Technical Institute came up with the solution. The training given and learned had to be of the highest quality and Schofield had already decided that the training had to replicate that of learning on the job in the factory. There would also have to be close co-operation with the factories where the qualified students would go to work. His plan was "Training on Production" Both the Ministry and the employers eventually approved of it.

10 SCHEME FOR TRAINING SEMI-SKILLED WORKERS FOR MUNITIONS WORK AT TECHNICAL INSTITUTES

On 5 November 1915, a memo was circulated around the Technical Schools and Institutes. Essentially the Schools and Institutes would indeed train up semi-skilled workers for munitions work. The successful courses and educational establishments had convinced the Ministry that this type of training was viable and would succeed. The main bulk of the training courses nationally would concentrate upon semi-skilled work unless Institutes were involved in the training of skilled workers such as gauge makers and tool setters. Although the training was to be centrally controlled the Ministry did not lay down a rigid set of regulations instead a list of guidelines was set out.

If the Institutes wanted to access the funds available for the training courses they had to adhere to the guidelines and all training had to be practical. Two elements of the training had to be left out. There was no academic learning or bench work; both took too long. Where female students were taken on assurances of their placement had to be gained before they began training. Heads of Institutes and their staff were encouraged to liaise closely with the factories to ensure that the best co-operation was possible. Their out of pocket expenses were guaranteed and the financial arrangements and benefits for the Institutes who involved themselves in this training, mentioned earlier, were laid out. Schofield, knowing that University College Nottingham was over-flowing with student applicants to train as shell-turners, immediately saw that Loughborough Technical Institute could be part of this project and he saw the possibilities for his establishment.

11 LOUGHBOROUGH TECHNICAL INSTITUTE

Schofield admitted that his plan was not new. What was new was the process and it was, in the main, what the factories required. Loughborough Technical Institute was going to train students to semi-skilled level while working on genuine production of shells. They would learn to turn shells in the manner prescribed by their future work place and on the type of machines that they would eventually use. The Institute would become a small factory whose final product would be trained munition workers. The small number of shells manufactured would be a useful by-product. It would seem that the notion of the “Instructional Factory”, and it was a title that Schofield always claimed as his own invention, had its genesis in Loughborough sometime between December 1915 and January 1916. Not in September 1916 as claimed by the Ministry.

In December 1915, while second hand machinery was sought for the Institute’s workshop, Schofield managed to forge the beginnings of a close relationship with the industry he sought to help (Foden, 2007). During a visit that month, he was able to persuade Cammel Laird in Nottingham, who were sceptical, to give him a contract for a small number of 18-pounder shell bodies (Loughborough, 1915). In return he offered to train and supply them with 500 semi-skilled shell turners. This was the beginning of close contact between training establishment and factory. This was exactly the kind of integrated approach that the Ministry wanted and it worked. On 31 January, after a frantic month during which the staff created a workshop space and installed and repaired the second hand machines sourced from the local area, the first thirty female students arrived and began training under the tutelage of Schofield and his small staff.

12 THE TRAINING COURSES

To begin with, two courses, known as a double shift system, ran at the Institute. On the day course, thirty students were trained at a time. They undertook a two-week course that amounted to some 40 hours practical tuition about how to turn shell bodies on lathes. The evening/night shift, learning the same skills, was for groups of between 17 to 28 local women. In line with the Ministry’s advice there was a caveat to joining the course. All students had to undertake to go into munitions work on completion of their course.

Many students arrived with no industrial background at all. During 1916, to assist the training course, Schofield and his colleague Driver wrote and published a handbook about shell turning (Schofield & Driver, 1916). It was intended that the students read the book and it was on display in the canteen. The book is really ‘turning for beginners’ and seeing that no written evidence of the

training curriculum exists at Loughborough University this book, now reprinted, is the only surviving written documentation of the course. It is, in effect, the training course for semi-skilled shell-turners.

13 THE SYLLABUS

The short course was divided into the following sections and the following is what the students did in their two-week course.

1. Instruction about lathes. The students were introduced to lathes and they were explained in general and simple terms and they were introduced to common terms and names. They were instructed from the simple to the complex; the engine lathe, the semi-automatic lathe and the automatic lathe. In the case of the latter, the students were informed that these lathes were intricate in design and required skill to set up. By way of encouragement (or goading) they would be told that a boy once he had mastered this type could run several at once, on his own...
2. Shell-turning. This was the core of the syllabus. They learned the processes of centring, boring and turning, facing and recessing.
3. General hints for good working practice and care of the machines. In this part of the course they were taught about lubrication, cleaning, what protective clothing to wear and they were warned about getting into bad habits with the machinery.
4. Instruction about cutting speeds.
5. Instruction about cutting tools.
6. Engineering measurements. The need for accuracy and the methods of measuring was taught but because of the repetitive nature of the student's work, they were made familiar with limit gauges.
7. Measuring instruments. The students were introduced to the different kind of measuring instruments that they would come across in the course of their work.

14 SUCCESS FOR TRAINING

It would seem that as the course progressed, the students were split into groups of six and while some were turning, others were put on boring and finishing. They rotated through the tasks (Rotherly, 1960). The Ministry took note of the course run at Loughborough, very much approved of the programme and it was claimed that the Loughborough Technical Institute was much admired. In this way 400 women semi-skilled munitions workers were trained by the Loughborough Instructional Factory and absorbed by Cammell Laird's between the end of January and April 1916. Cammell Laird's were delighted with the quality of the workers that Loughborough produced and requested more. Based upon this success, as time and the war went on Loughborough, like other educational establishments, began to offer more and increasingly skilled courses in other fields of munitions production and aeronautical work.

15 OPTIMISM AND DISSENT IN GOVERNMENT AND EDUCATIONALISTS

By the end of February 1916, fifty-seven courses were up and running and 2,400 students were enrolled. It was planned for 4,000 students to graduate a month but this turned out to be optimistic and problems placing trained students persisted in some areas. In some cases, it was because the factories were still being constructed and the workforce could not start. Some areas there was no munitions work. In others, lodging for newly arrived workers was expensive. The Ministry noted that some employers remained prejudicial. Some Institutes were capable of training skilled workers and were doing so. Some in the Ministry doubted if the factories could train enough skilled workers but nonetheless they urged the factories to try. In the meantime, the educational establishments would train the semi-skilled. There were those in government who thought that the project for using the training schools to provide new workers was pointless and would fail (HMSO, 1920). The factories, some still said, would do a better job of training. It would seem that no one could agree.

16 CONCLUSION

By 31 August 1916, 22,500 students received their training certificates of proficiency and 18,000 were placed in work (HMSO, 1920). March 1916 was counted as the high water mark for training

semi-skilled workers, a remarkably short space of time. After this, probably because they had proved their worth and convinced the Ministry of their effectiveness, increasing numbers of skilled workers were being trained by the Institutes. During the months of June, July and August 59% of the students graduating were women and a good number had been happy to move to another area to work. For example, the women taken from the fish industry in Aberdeen who trained at Robert Gordon's College and who transferred to the West Midlands to work in the munitions industry. Testimony came into the Ministry from all quarters praising the women trained by the Technical Institutes. As they fed into the workplace from the Institutes women began to prove their worth in manufacturing engineering. As time progressed they took more responsibility on the shop floor and some went on to train in skilled roles. Such was their impact and ability the Ministry encouraged their employment in the manufacture of shells and aircraft. In fact, in manufacture of the latter, their employment was demanded. September 1916 saw an important change and an important departure; officially, the notion of the Instructional Factories was born. The Ministry acquired a number of factories and Institutes, Loughborough (expanding all of the time) being one, under powers conferred by legislation Schofield, who remained in charge at Loughborough, was delighted and new courses were set up to teach skilled work. More money was sanctioned for more buildings, machines and staff and, because of the size of the new training facilities, more students could be trained. Being trained by quality staff on up-to-date machinery in a training factory, the qualified students were of high ability and the prejudices of employers and unions began to fade.

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