EDITORIAL

PRACTICAL TRAINING IN MANUFACTURE

The Twenty-Fifth Anniversary of the Faculty of Engineering at St. Augustine is an appropriate time to look at some aspects of progress in technical education. Early in this period, an organizational model was adopted having two tiers, with a professional stream channelled through the new university and a craft stream channelled through technical institutes. Since then, opinion has shifted slightly towards the provision of professional training in polytechnics, but in some countries, this has always been the accepted practice. Many of these schools of engineering owe their success to their sensitiveness to local requirements. Industrial liaison helps to give relevance to the courses offered and also helps in the placement of graduates in those jobs that are of a description addressed by the courses.

If a doctor was not able to take your pulse, you would have doubts about his training. Yet those who teach engineering in universities often find excuses for neglecting practical training, which they claim is not a fit subject for their attention, or is something that should be done elsewhere as it cannot be fitted into a crowded three-year syllabus. In many universities in the United Kingdom, feelings of consternation and guilt were aroused by the appearance in 1979 of the Finniston Report. This recommended a course structure including a phase of manual work with materials of construction, followed by projects and group activities. In one respect, this may have been a protest against large classes in which students were not getting individual tuition. Teachers might feel that this scheme makes heavier demands on them, and possibly they might feel that they are not ideally fitted to give this kind of instruction. However, professional associations have recently attained a position of influence in setting guidelines, which necessarily have to be followed before they will grant accredition to a degree course. The kind of practical instruction of direct concern to university teachers is that which should preferably be given concurrently with the degree course. One factor here is that selected practical exercises illustrate the lecture material and improve motivation. Another factor is that the teenage years are those when impressions sink deepest, and when attitudes become fixed.

As engineering became organized for making steam-ships, locomotives, motor cars and aeroplanes, there was a simultaneous evolution of trades, each requiring an apprenticeship. This scheme worked well and led to great achievements. I remember an occasion when I felt indignant on hearing a civil engineer speak disparagingly about apprenticeships. Perhaps he could not see why it should take five years to learn how to use a shovel! Perhaps he did not appreciate the complexity of mechanical engineering, which needs the services of blacksmiths, fitters and turners, boiler-makers and copper-smiths, pattern-makers and moulders. Traditionally, the professional engineer focussed his attention on the functional performance of his products, leaving the manufacturing side to draughtsmen and craftsmen. He was expected to gain a broad idea of the purpose and scope of the supporting crafts. This coverage of the theory and practice of mechanical engineering required a total period of formal instruction extending over about seven years. For various reasons, this scheme broke down many years ago, and will not come back.

One reason is that many kinds of engineering hardware have reached a designed plateau, where success depends less on making bigger and better models, and more on making them economically. Intense competition means that the engineer must have a firmer grasp on the planning and costing of manufacture, and he is not now so free to delegate this to others. Another way in which the organisation of mechanical engineering is changing is that many craft mysteries are being analysed and codified in terms of scientific principles. The future engineering student will not recognize the need for any intermediate skilled person, as he will address the machine directly through an unambiguous programme. As responsibilities become grouped in new ways, the status of the professional engineer needs to be continually re-examined. One would hope for an emergence of special requirements related to local needs, with attention to the provision of educational bridges for partially trained people.

The proper provision for practical training requires more than a mere extension to a mechanics laboratory, and must include production equipment similar to that in current industrial use. A renewed commitment to the improvement of practical training is much in evidence at St. Augustine. Substantial investments have been made in equipment for casting and machining. I should make it clear that I am a recent addition to a group who have been working on the planning of laboratories for many years. At present, five numerically controlled machine tools are installed, two being small instructional machines, and three being rather expensive full-scale machines. Project work, already accor prominent place in schemes of study, will be broadened in scope as these machines become fully operational. considered essential that these machines should be utilized in collaborative ventures with industrial firms. This will to studies of the economics of manufacturing various components in Trinidad and Tobago. Enquiries under heading are welcome.

In the area of engineering manufacture, a question of policy arises as to what kind of technology should be ta Some might argue that Trinidad and Tobago has industries that are relatively rudimentary, and these industries sh be able to utilize manually-operated machines. These could be procured for next to nothing, as European factories thrown out large numbers of them in recent years. Unfortunately, the industrial world is a small place. There i assured local market for local industries any more, unless import barriers are set up. The widespread uniformity in is considered to be good practice means that production equipment which is uneconomic in one country is une omic in them all. Therefore, teaching the use of out-dated equipment, or failing to take teaching to the stage whe is relevant to current practice is misleading and unhelpful.

Generally, the simpler the tools are, the more highly skilled the man must be who uses them. Prolonged trai during adolescence used to be necessary for developing co-ordination between hand and eye. Much of this dexterit the control of spatial positions of objects can now be taken over by numerically controlled machines and robots. argument sometimes put forward for giving instruction on manually operated machines is that modern machines changing so fast that it is impossible to keep pace with them. This is not quite true. There has certainly been a re lution in machine tools. All the handles have disappeared, and have been replaced by servomotors. However, now t this has happened, the technique of using the new machines is settling down. Although a new method of contro used, the knowledge that the operator formerly needed about working conditions appropriate to the process will still needed in an almost unchanged form.

A popular fallacy about tomorrow's factory is that it will be set in motion by just pressing a button in the morni and that life will be easy for those who work there. Automation will remove the drudgery, and indeed will remove it but will not remove anything else. The useful output of the factory will wholly depend on the input of a team intelligent and dedicated people, who will need most of their old skills plus some new ones. Surely the first duty o teacher of technology is to identify these skills. One of the tasks will be to define what is meant by practical training, view of present and projected trends. This will be a little different from what it was ten years ago. It might appear th in technology, there can be no equilibrium or position of rest, now or ever.

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