

ment. On the contrary, they tend to be those who could easily secure a place for a single discipline. In any case, our combined studies courses are of honours standard and not in any sense an easy option.

The same desire for "generality" is also revealing itself in other countries. Even though the school courses for both *Baccalauréat* and *Abitur* do not show as much specialization as the British sixth form courses, and in spite of the possibility of breadth of study in French and German universities, it is clear that many science graduates in France and Germany feel that their undergraduate course still left a good deal to be desired. An article in the June issue of *Réalités* (pages 84-88) shows this very clearly. Some of the conclusions drawn by French graduates now working in industry are very revealing. "There is no point in packing the curriculum with the rudiments of all the specialisms. You end up with mere nomenclature. It is the old problem of whether to have a well-trained head or a well-filled head. The question 'Is an engineer a scientist or a business man?' has not been answered. Technical development in certain fields is so rapid that scientific training can only to some extent prepare the student to understand new technologies. In a managerial position for example, 90 per cent of a man's technical knowledge is not derived from his university education."

These are some of the problems facing the university teacher in faculties of science and technology. In our view, Dr Davies has made out a convincing case for more "generalism" in scientific and technological studies. It is up to the universities to see that the wishes of undergraduates and the needs of industry receive a hearing.

Yours, etc.,

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### No Change for Chemistry

SIR,—May I clear up some misunderstanding which is apparent from your comments on the Royal Society Postgraduate Training Report on Chemistry (News and Views, June 3)? Your implication that industrial views were ignored is inaccurate, as a reading of the report would show. A forceful industrial critic of the academic set-up was a member of the committee, and the most frequent industrial grumbles were quoted in an "Industrial-Academic Relations" section.

Again, a "product opinion" survey was deliberately not attempted because we knew that an exercise along these lines was being planned in conjunction with the Royal Institute of Chemistry; indeed, a member was common to both committees so that duplication could be avoided. In your further comment on June 10 you seem to have just become cognizant of this RIC committee (although it was mentioned in the Postgraduate Report) but again you do not seem to have realized the mutual awareness of these two projects.

Yours faithfully,

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THE industrial criticisms mentioned in the report, and the single reference to the RIC committee, are included in the two paragraphs reproduced below:

"It is generally agreed that in chemistry there is a greater-than-usual degree of mutual understanding between university and industry. One healthy facet of this relationship is that neither treats each other with over-exaggerated respect; reciprocal comment, both public

and private, on each other's methods and aims is usually forceful and sometimes fruitful.

"One perennial industrial complaint concerns the reluctance of postgraduates to enter industry in the UK, and is usually coupled with dark hints of conscious or unconscious brain-washing on the part of the supervisors. In this view, the present postgraduate training is regarded as a self-perpetuating system for academics with little concern for the need to produce industrial pace-makers. The Swann and Willis Jackson Committees have already discussed this problem and it will not be dealt with further here, except to point out that the situation in chemistry is better than earlier alarmist statements suggested. It is also relevant to note that an industrial-academic Committee of Enquiry has been appointed by the British Chemical Education Committee (a Royal Society-Royal Institute of Chemistry body) to investigate in detail the relationship of undergraduate and postgraduate courses and training to the needs of industry. Another industrial stricture is typified by a recent article which pours scorn on university training topics as being trivial, eminently predictable, mere straight line extrapolations or interpolations from known phenomena. Many university problems are also regarded industrially as being too rigidly narrow, tending to inculcate a blinkered and restricted mental attitude in the student."

—Editor, *Nature*.

### Applying Research

SIR,—Recently published figures purport to show that the UK is spending nearly as much on research and development as the whole EEC combined. Few of your readers would question the correlation between today's production and the research of a few years ago. Yet our Gross National Product increases with painful slowness. There is something here that needs explaining. Possible suggestions:

(a) The law of diminishing returns is operating in a big way.

(b) That taxation advantages, and accountants' views about what expenditure does qualify as "R and D", differ so much from industry to industry, and from country to country, that valid comparisons cannot be made.

(c) The tendency to regard a research department as a prestige symbol worth paying for, like an over-elaborate headquarters building. (I can think of research departments that seem to have been closed down for reasons bearing little relation to the quality of their work.)

(d) That industry has still not learnt to use scientists and engineers properly. (I once interviewed a distinguished Ph.D. of several years standing, whose job was to devise schedules of cutting up steel rod and plate in order to fill orders with minimum wastage! This is, I hope, a very extreme case of inefficient use.)

(e) That, in a typical firm, a number of people in the "research department" are in the process of being groomed for administrative and sales work.

Comparison with the USA hardly suggests that (a) is an important factor. I am sure that all the others are operating to some extent, and I suggest that attempts to measure some of them, even roughly, would be very timely indeed. I feel sure that some of them can be measured, though I am not myself qualified to do so.

Before we start telling ourselves that we are hopelessly inefficient in applying the results of research as compared with, say, West Germany, it seems to me important to establish whether the disparity of real research effort is really so great as the raw figures seem to suggest.

Yours sincerely,

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