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Physics With

Many agreed at the EPS-10 General Conference symposia on education and employment opportunities that it was difficult to generalise what sort of physics should be taught and to how many. But, paradoxically, there also was a strong feeling that there needed to be a clear rationale why a certain type of physics needed to be taught in a certain way.

There was agreement that one should generally start from the basis that young people coming to universities to study physics want to learn physics (exceptions were those countries where restricted opportunities meant that physics offered a "back door" into university). One must therefore be very "honest" when proposing UK-style "physics with" curricula where a physics department is responsible for say two-thirds of a first-degree course. In many cases it would be better for a student to study entirely within a computer science or business management department, for example.

Given honesty, the question then is to what extent the "physics" part should train students to work in fields outside of physics. Some participants took a pragmatic view by saying that since some countries are training too many physicists or physical engineers (see page 167) the only immediate way out is to find jobs in a broad spectrum of areas, and to train people accordingly (in the longer-term one can reduce the output). But such an approach often faced two, related, difficulties. First, other disciplines, notably engineering, have long-established professional roots and structures which tended to keep out newcomers. Second, there was no tradition in some countries to employ physicists outside research.

The participants felt that to overcome institutional barriers when competing with say engineers and computer analysts in today's difficult job market, young physicists needed measures that develop self-confidence. This self-confidence, indeed the essential justification for placing oneself on a broadly based job market, came from the fact that modern physics offered analytical problem-solving skills that were generic and widely applicable. Such skills were in a nutshell the essence of physics for many of today's physicists. This perspective together with an interest to find out what problems need solving, familiarity with mathematics and advanced computing techniques, and experience in an international working environment should represent a winning combination.

Unfortunately, it was unclear from the discussion if generic skills are central to physics curricula in Europe (see page 170). Some participants argued that "the continental [Europe] idea was to produce broad, flexible problem solvers who are able to adapt to different problems" and to approach "problems in a systematic, analytical way". Others felt, however, that physics education in Europe was "too knowledge centred and not skill centred". Nonetheless, physics education has been sufficiently skill centred to allow physicists in east and central Europe to find jobs following public-sector cutbacks. There have also been clear moves in some countries, notably the UK, towards skill formation via physics courses that reflect industry's call for generic skills. Another approach (in Belgium) had been to develop broadly based science courses designed to allow specialisation in applications ("actualising studies").

Much of confusion about the need for a central rationale in physics education and how it should implemented came from persistent stereotypes. For example, the UK was seen as producing highly specialised physicists well-adapted for industry's needs who could be turned out "very young" in contrast to the broadly trained, flexible, adaptable but much older problem solvers produced elsewhere in Europe. It soon became apparent that this difference was only true up until a few years ago. The lesson was that even if physics can agree on a central rationale for why it should tend to train students in a certain way, Europe's "tremendous diversity" meant that telling each other how this strategy can be put into practice needed a much greater dialogue between educators. Hence the importance of the EPS Interdivisional Group on Physics Education which aims to be a channel for distributing information.

P.G. Boswell