40 YEARS OF CURRICULUM DEVELOPMENT

JON OGBORN

University of London, UK

ABSTRACT

I discuss a number of features of world-wide science curriculum development, including the extent to which each development is local and specific, the relationship to issues and ideologies current at the time, the question of 'top-down' versus 'bottom-up' development, the role of didactic inventions and creativity, the relationship of development to research, and the question of ownership.

1. PERSONAL INTRODUCTION

Thirty-five years ago I was asked to lead – with Paul Black – a national curriculum development project in the UK. That was *Nuffield Advanced Physics* (Ogborn, 1971). I thought of it as a unique experience. Then, thirty years later, I was asked to do the same again, for the Institute of Physics project *Advancing Physics* (Ogborn & Whitehouse, 2000; Ogborn & Whitehouse, 2001). Rarely is anyone invited to make the same mistakes twice over. At the risk of over-personalising what I have to say, it is from this standpoint that I have chosen to look back over forty years of curriculum development in the sciences.

Before I get started, I should commend to you another account, by Myron Atkin and Paul Black, of their experiences in curriculum change, in their book *Inside Science Education Reform* (Atkin & Black, 2003).

2. CURRICULUM DEVELOPMENT WORLD-WIDE

Since the late 1950s and early 1960s there has been a huge amount of science curriculum development work, varying widely in scale and in motivation. Some sought to refresh science teaching; some to make it more efficient. Some have been adopted (or imposed) nationally; others have made their way as a free choice on the part of schools.

I have to be careful. I'm much better acquainted with efforts in the UK and in the English language, than with others. I have a natural bias towards work in physics education. Moreover, I have learned over the years that you cannot understand curriculum change in any country, without a clear understanding of the culture and the specific historical circumstances. This I signally lack in many cases.

K. Boersma et al. (eds.), Research and the Quality of Science Education, 57—65.

I offer my remarks, not as a carefully worked-out theoretical scheme, nor as a well-researched narrative, but rather as a patchwork of thoughts that occur to me as I look back and reflect.

3. LOCAL SPECIFICITY

The Devil, it is said, is in the details. This seems to be very true of curriculum development. The early large-scale developments in the USA, notably the Physical Sciences Study Committee (PSSC, 1960), Harvard Project Physics (Rutherford, 1970), Chem Study (Campbell, 1962) , the Chemical Bond Approach (CBA, 1962), and the Biological Sciences Curriculum Study (BSCS, 1959), all hoped to have an influence well beyond the confines of the USA. So they did, but more often through the fact of their existence than through direct adoption in other countries.

The first reason is simple: they were all finely tuned to the needs of the American educational system. PSSC made good sense for a system in which high school students began their first substantial study of physics at age 16. But in the UK, where physics was taught from age 11, it made little sense. As a result, the sponsors of PSSC complained about it not being "translated into English".

A second reason has to do with ownership and creativity. The main reaction of teachers and educators in European countries to these US projects was to want to try to do it for themselves. Local pride, and local awareness of essential subtleties, played an important role. As a result, over the 1960s and 1970s, a variety of projects burgeoned throughout Europe: for example PLON in the Netherlands (PLON, 1985) and "Ask Nature" in Denmark (Thomsen, 1978), besides the dozen or more projects sponsored by the Nuffield Foundation in the UK.

Each was very specific to its time and place. New teaching programmes have to be a very good fit to local circumstances, taking account of different structures of schooling, of different times available for teaching, of the varying prior knowledge of students, of the expectations and preparation of teachers, of official rules and regulations.

But could we not all agree about the essential structure of physics, chemistry, or biology, and about good ways to approach the central concepts, and then tune these in detail to local circumstances? It turns out not to be so. Just as good architectural solutions often arise from turning disadvantages of an awkward site to positive advantage, so good educational solutions often capitalise on local problems and constraints, turning what looks like a difficulty into an opportunity.

An example might be the emphasis in the UK projects on first hand laboratory work for students. UK science teachers found their school laboratories full of old pre-war apparatus. Students disliked the excessive amount of theory, with concepts not much linked to experimentation. The solution was to develop new equipment and to promote the notion of exploratory play with apparatus. This kept pupils and teachers happy, and was in tune with the general empiricism of Anglo-Saxon culture. The developers were surprised to find that teachers in France, Italy, Spain, or Portugal were unimpressed, giving rigorous theory a much higher valuation than did the empiricist English.