

"THE PUBLIC GOES SHOPPING FOR SCIENCE"

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Perhaps the most effective means by which the public could gain a better understanding of science would be by participating, in as highly active and self-motivated a way as possible, in some part of its practice. However, outside educational and training contexts there are very limited opportunities for them to do so. Passive and somewhat vicarious participation may be encouraged by the media and by more progressive museum exhibits. But even in these situations it is not clear that people have an intrinsic motivation to understand what is being presented to them.

One institution which may have rather more to offer in these respects is the science-shop. This (originally Dutch) concept is relatively unfamiliar in the English-speaking world. Its most comprehensive exposition to date is in Dutch (Pennings & Weerdenburg, 1987 - with an English review in Brock, 1987). Because of the language barrier which this poses (through c.f. Ades, 1979, Hofman & Bokkerink 1987, and Leydesdorff et al. 1987), it may be useful to preface the claim as to science shops' potential for adding to the public understanding of science by a brief description of their nature and activities.

In addition to indicating what a science-shop is, archetypally, this article will say something about its export to other countries from The Netherlands. In the case of the United Kingdom its very recent arrival will be contextualised by referring to a number of not wholly dissimilar initiatives which have been mounted here within the past few years. The potential of science-shops for enabling some sectors, at least, of the public to understand more about science will be pointed up

through a critique of a well-known report on the subject by the Royal Society. It will be argued that that report takes no account of certain dimensions of the terms 'public', 'understanding' and 'science', which would be precisely the concerns of a science-shop. In concluding the article, it will be suggested that there is an unfulfilled research agenda with regard to the role and achievements of science-shops in their mediation between lay curiosity and scientific knowledge.

### The archetypal science-shop in The Netherlands

At its simplest, a science-shop is a means by which sectors of the community which have a need for information, but do not have the educational or material resources to carry out or pay for the necessary search for it, can gain access to appropriate knowledge and skills at a university. A science-shop acts as a 'go-between', between the university and client-groups in the community who have a need for information. A client-group must satisfy three criteria: they have no money to pay for research to be done; they have no commercial aims; and they are in a position to use the results of research to bring about some improvement in their situation or that of the people whom they represent. The science-shop thus differs in important respects from a science park or similar body which serves commerce and industry. Its clients come for the most part from the voluntary sector.

The term 'science-shop' is a translation of the Dutch 'wetenschapswinkel'. 'Wetenschap' refers to all academic knowledge (cf. the Latin 'scientia') and does not have the common natural science denotation of the English 'science'. In The Netherlands, each of the twelve universities has for several years now had at least one science-shop. There are some fifty in all. A Chemistry Shop was set up in 1973 in Utrecht, in the wake of the late-60's movement to democratise universities. The first all-purpose (or multidisciplinary) shop was set up in 1977 at the University of Amsterdam.

Despite initial political resistance and fears that 'serious' research would not be done through science shops, they quickly became accepted - more quickly, perhaps, by government than by the university authorities. In 1979, the Dutch government in a memorandum on the function of research in universities expressed its approval of science-shops as a means of providing free access to university research potential for poorly-resourced groups. This message was reinforced in circulars and policy documents in 1983 and 1984: every university should have a science-shop, and room would be created in the grant to universities to finance science-shops. During the 1980's, despite an anxiety that they would become early victims of the stringent budgetary cuts facing the university sector, their financial security has in fact been strengthened. They were helped in the second half of the decade by the universities' concern to justify their activities to the public, and by their worry about a possible gulf between the production and application of knowledge.

There are two basic types of science-shop. One is unidisciplinary, specialised and decentralised (e.g. a chemistry, law or history shop). It carries out research itself for clients. This model is in the minority, and will not be discussed further here. The more common type is a multi-disciplinary, multi-purpose and centralised organisation. Its principal role is as mediator between the client group and potential researcher in the university, rather than in carrying out research in-house - though it may do so.

Mediation is the key component of a science-shop's operation. The process is briefly as follows. When a potential client approaches the science-shop with a request for assistance, the first step is to decide whether they satisfy each of the three criteria referred to earlier. If they do, a member of the science-shop staff takes the request 'in mediation'. Any necessary additional information about the request is asked for; after which the mediator searches for possible sources of assistance in the university. In some cases the request may be

referred to another university or other body, if it is better equipped to help. Mediation is taken to fail if no possibilities for assistance can be found, for whatever reason; or if the client loses interest, is dissatisfied with those possibilities or withdraws the request. In successful cases, the mediator and client explore the possibilities together and outline a strategy, which they subsequently discuss with the researcher. At this stage, the request may be reformulated. If a basis for proceeding to carry out research can be found, it will lead eventually to a report, not necessarily in writing, or to advice. Monitoring the progress and satisfactory completion of the research is an important part of mediation; as is a three-way discussion of the contents of the final report. The ideal of the Dutch science-shop was originally that the mediator role should be filled by a lecturer or student. Increasingly, in practice, it is filled by staff of the science-shop.

Research is carried out, typically, by students under the supervision of academic staff of university departments. The students may be on a 'field placement' or be working on their final year dissertation. In some cases, unemployed volunteer graduates or academics themselves may carry out the research. Academics may be involved in particular when a client's question can be answered from existing knowledge - 'encyclopaedically', which is very often the case.

Any discipline in a university may contribute to the work of a science-shop; though Zaal & Leydesdorff (1987, p.314) report, on the basis of experience at the University of Amsterdam, that "The clients of the science-shop seem to be better informed about the nature and possibilities of the social [than natural] sciences". Client-groups are equally varied: for example, environmental groups, urban organisations, Third World groups, trades unions, welfare workers, women's groups.

The reasons given for establishing or working in a science-shop have been varied, and have seen some shift in emphasis with time. In the 70's, science-shops were seen as a means of 'societising' science (vermaatschappelijking) or democratising it. There was a clearly political motive: by distributing knowledge more widely, power would be given to disadvantaged groups. Economically, a share of the total public sector research budget, which was and still is expended overwhelmingly in the interests of government and industry, was to go to hitherto unrepresented sectors. They were to be given access to the means and process of knowledge production.

In the 80's, as science-shops gained operational experience, and as the political climate changed, they became more interested in attempting to influence the research agenda of universities. The notion that knowledge transfer should involve a two-way bridge between universities and society, and that society should contribute more input than hitherto to the formulation of scientific problems, had been present at the beginning of the science-shop movement. It subsequently attracted more attention for several reasons. Most importantly, perhaps, the shops wished to occupy a less marginal position in university structures, not least in order to improve their financial security. One way of attempting to achieve this was to be seen to be engaging as equals in the university's research activities, which themselves were under external pressure to become more concentrated and programmatic. Earlier attempts to influence research agenda had largely been restricted to encouraging staff and students to take on board the particular problem of individual clients. More recently, programmes of research on, for example, poverty and social development, aging and policy, or soil pollution have been proactively and successfully mounted by several science-shops. In doing this, they have been identifying general problem areas of interest to potential or hypothetical clients; and at the same time have produced a more substantial and academically interesting research agenda for university colleagues.

A secondary reason for this move has been the development of other agencies than science-shops to provide the basic information and advice, and answer the more individual and concrete questions, which had been the bread-and-butter of science-shops. In addition, the student volunteers who carried out much of this work are now in short supply, because of the reduced number of years permitted them to graduate, and their generally more pragmatic attitude to university education.

That latter factor underlies another and more recent shift in the science-shop motivation. The students who take part now in a shop's activities do so for more instrumental reasons than before. Social or political motives are balanced by attention to the career-oriented and marketable skills which can be gained there. Correspondingly, it is the university authorities who now see the social gain to be had from the science-shops. They help the universities in their public justification of scientific research; and with the gradual demise of the more commercially-oriented 'transfer points' or industrial bureaux, are an increasingly important demonstration of the bridge between knowledge production and application.

#### Exporting Science-Shops

Postuma (1989) has briefly documented the 'export market' in science-shops. In Denmark they are called 'Videnskabbutuk', in France 'Boutiques de Science', in Germany 'Wissenschaftsladen', and in the United States 'Public Service Science Centres'. Similar initiatives have also appeared in Belgium, Austria, Finland, Switzerland, Sweden, Italy, Spain and Australia - although in those countries they tend to be isolated and poorly documented instances, with a precarious existence. The two Danish examples, in Copenhagen and Lyngby, have been incorporated into their universities. In Germany, 25 cities are reported to have a science-shop.

The extent to which the initiatives there are established within a university structure varies; and funding depends on local cultural and political considerations - in most cases, it is for temporary, experimental periods.

A more detailed participant's account of French science-shops has been given by Stewart (1988). Six shops opened there in October 1983, against an ideological background which strove for a socialist self-management of the production, distribution and utilisation of knowledge, and which was encouraged by Mitterand's election as President in May 1981. A further six shops appeared in 1984. But two years later, three had closed and the others were in difficulty. By the end of 1988, the network of French science-shops had six members remaining. Government support had failed. Stewart also attributes the decline to the unwillingness of scientists to meet the public on their own ground, and to the public's very limited interest in science or quite unrealistic expectations of it. The boutiques never gained a foothold in the universities, nor proper recognition from government.

#### Comparable initiatives in the United Kingdom

At that time in the United Kingdom there was no example of a science-shop. Though then and since there have been several related initiatives. For example, at Coventry Polytechnic in 1984 an action-research project was mounted under the title of 'Study Service'. It "acts as a link between community organisations and students, enabling pressing issues of community concern to be tackled by students as an integral part of their studies" (Carter, 1987, p.8). Its emphasis on benefits to the student, and the fact that in the first three years of operation more than 60% of clients were local authorities or health authorities distinguishes it in important ways from the science-shop. A similar 'research exchange' has recently been set up at Trent Polytechnic in Nottingham.



The Research Exchange in Manchester has since 1983 worked to forge links between community and voluntary groups in need of knowledge and expertise and students who are in a position to provide it. The initiative came from and is located in the voluntary rather than the university sector: as a consequence it is able to tap into the resources of several higher education institutions. Its funding has been subject to the usual vagaries of the voluntary sector and its local authority political paymasters.

In one or two cases, a medium has been established by which groups could be assisted to carry out research themselves. For example, the Council for Voluntary Service in Newcastle-upon-Tyne set up a fund which offered small sums to groups to carry out research. The panel which decided on grant applications also helped applicants to design their research, and several of its members came from the local university and polytechnic.

One can also refer to more focussed enterprises, such as the Greater Manchester Hazards Centre, originally based in Manchester Polytechnic; or the Community Operational Research Unit, based at the Northern College, and supported by staff of Sheffield City Polytechnic and the Universities of Leeds and Hull.

#### Science-shops come to the United Kingdom

There have now been three science-shop initiatives in the UK to which reference can be made - in Northern Ireland, at Queen Mary College, London, and in Merseyside.

Early in 1987, the Nuffield Foundation made a grant to the Policy Research Institute in Northern Ireland to support a three-year science-shop demonstration project. The first co-ordinator took up post in May 1988, and the shop is now set to continue at least until the beginning of 1993. Because the Institute is a joint body of both The Queen's University of Belfast and the University of Ulster, the shop is able to draw on the personnel and student resources of two universities.

I will restrict remarks on the experience to date to just three points. There was a delay of nearly a year between being awarded the grant and being able to establish the shop. This was due to 'political' opposition from one of the universities. Although it was probably based on many considerations, these included difficulties which arose from the initiative's relatively external origins, the implicit suggestion that the university was not completely fulfilling the duty to community service expressed in its Charter, and the extra call on university resources at a time of budgetary pressure. Neither university could see that a science-shop would help their UFC ratings or research selectivity status.

Secondly, we found it of great benefit to have a fairly long lead-in period before opening the shop to the public. Some nine months were spent in establishing the 'supply' side of the operation, in order to minimise later delays and frustrations on the part of clients. This time was needed for several reasons: because two universities were involved, there was no relevant pre-history to the initiative, and the co-ordinator came from the voluntary sector and was relatively unfamiliar with universities.

Thirdly, we have not been overwhelmed by calls on our services. This is not out of line with the initial experience of Dutch science-shops. But I do have a lingering doubt about just how far the voluntary sector, in Northern Ireland at least, wishes or can be persuaded to use university resources. That will be an interesting question for evaluation. The Nuffield Foundation has commissioned an independent evaluation of both the science-shops which it supports.

The second shop was to have been at Queen Mary College in London. A grant was made in 1988, on the basis of a proposal which sprang from the Northern Ireland initiative. The proposal would have formed an interesting contrast to that more 'classic' version. The London shop was to have been grafted onto a new market-oriented bureau which Queen Mary College was establishing.

INTERFACE, as it was called, was to provide subscription-based access to the time of university staff for industrial and commercial bodies. Nuffield's grant was to be used to pay the subscriptions of a number of umbrella groups in the voluntary sector. In The Netherlands, such a structural link between the serving of commercial and non-commercial interests has only been approached at the Rijksuniversiteit Limburg in Maastricht.

Interestingly, the Queen Mary College initiative also suffered from being relatively from outside the university. The initiator was not a member of academic staff. Problems in setting up INTERFACE rubbed off on the intended science-shop. And total collapse eventually came when the senior academic who was championing the establishment of the shop left the university.

The Merseyside science-shop also has a more market-oriented partner, but one which was both already in operation (since 1982) and enjoying very strong support from the university, and at the highest level. It is planned to open the shop in 1990. The partner is the Merseyside Innovation Centre, which is an enterprise agency associated with the University of Liverpool, the Liverpool Polytechnic and the five Merseyside District Authorities. Its main role is the creation of jobs and wealth in small-to-medium companies engaged in technology. Apart from the structural link between the science-shop and this Centre, its other potentially interesting features at this stage are firstly, that it will offer access to many local companies as well as to the University and Polytechnic; and secondly, the question of how far it will cooperate and/or go beyond the Centre's interest in job-creation and wealth. This shop is also being supported by Nuffield and will be evaluated.

#### Public understanding through science-shops

Having described science-shops, however sketchily, I want now to ask what contribution they might make to the public understanding of science; and after giving a somewhat hypothetical answer, I shall suggest a possible research agenda which might provide a more informative answer.

One way of indicating the potential contribution of science-shops is by setting them in the context of the case developed in the Royal Society's (1985) report on the public understanding of science. While that report need not be taken as the last word on the subject, it is instructive to consider how many missing dimensions the science-shops would point to in it.

'Science' is defined there as mathematics, technology, engineering and medicine. Science-shops on the other hand have been more appreciative of the multidisciplinary basis of both their clients' problems and their potential for understanding. In the science-shops social science is also a subject for understanding.

'Understanding' in the Royal Society report is a matter of comprehending the nature of scientific activity and enquiry, and not just knowledge of some of the facts. Levels of understanding are seen as related to an individual's occupation and responsibility. Understanding does not seem to be about what science produces and why. Clients would go to a science-shop, however, with a purpose and to seek results. A full understanding goes beyond comprehension: it includes application and evaluation. Science-shop clients are encouraged to discuss with the mediator the report which is finally delivered to them, consider the actions which follow from it, and comment upon the usefulness of what they have learned. They can approach science without occupational labels, and while being responsible citizens can have an unlimited call on scientific knowledge without formal responsibilities.

The Royal Society's public knows five categories: private individuals, participating and responsible citizens, (semi-) skilled employees, middle management and major decision-makers. A number of remarks could be made about the choice of those categories; but it is sufficient here to point to the absence of explicitly collective interests outside of the sphere of employment, industry or government. Science-shop clients are difficult to fit into the categories.

The reason why it is important for the Royal Society that the public understand more about science is three-fold: to further national prosperity, by way of more informed public policy; to improve the quality of decision-making, for example in "the higher levels of the Civil Service"; and to enrich the life of the individual, by enabling better personal decisions on a variety of issues. Once again, there are no social categories or interests between management, government and private individuals. It is not suggested that the public use science as a tool to find out about the world.

Five means of improving public understanding are suggested: formal education; mass media; better communication on the part of the scientific community; lectures, museums, children's activities, etc; and initiatives by industry. Active enquiry and involvement in scientific activity, based on need - learning-by-doing - is notably absent from this list. Only children are permitted to be active! The focus in the report tends to be on one-way communication, from science to the public, rather than on dialogue or on the importance of enabling the public to determine the subject of understanding. This is the antithesis of processes in the science-shop.

Let me emphasise the science-shop's potential for improving understanding by active involvement in the production of knowledge. It is the client who decides on the problem. The client is encouraged to collaborate in formulating and designing the necessary enquiry. The choices which have to be arrived at are made explicit through the mediation process. Attention is not limited to the consequences of scientific activity, as is more generally so often the case. Clients are also encouraged actually to assist, if at all possible, in carrying out the research. Discussion of the results, and especially of the way in which they might be used in practice, will also contribute to a fuller understanding. Although there is undoubtedly a considerable gap of interest and understanding between the client and the academic, if the latter is a student it can be mitigated, and there may even be an approximation to a peer-learning situation. This can be very helpful to learning-through-doing.

## A research agenda

What science-shop clients actually gain, in understanding or otherwise, has scarcely been investigated. Indeed, very little research on science-shops is available (though cf. Leydesdorff and colleagues, 1984, on trade union participation in the Amsterdam shop, and on its effect on university science policy). And yet such research could throw considerable light not just on the science-shop phenomenon, but on a number of important issues for the public understanding of science. It would be an interesting test-case for research in this area, in the sense that it would focus on a more purposeful and active sector of the public than, say, television viewers, museum visitors or even school-pupils; and on a more dynamic process. For example, what is the nature of the need for science of a shop's clients? What do they need to know, and why? Do they want a wider understanding, are they helped by it; or are they content with the facts? What are their expectations of science, as represented through a science-shop; are they informed or realistic? Are they interested in the 'how' of science? What are the constraints on their active engagement in having their question answered? As far as concrete outcomes are concerned, what are the barriers to and facilitators of an adequate understanding of the end-report? Is it typically put to use in some application, or filed away in a curiosity box? Which factors aid application?

In suggesting that these are questions worth an attempt to answer, we would not wish to exaggerate their importance. Even in The Netherlands only a small fraction of the public will have even an indirect contact with science-shops; and it is still not altogether clear how well the science-shop concept 'travels'. However, if it is seen in the context of the broader set of not dissimilar initiatives, a few of which have been referred to here as alternative ways of facilitating a more active and self-motivated approach to science, then answers to the questions may be more widely informative, and even lead to further initiatives.

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